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Assessment and Analytical Framework for Sport Literacy: A Case of College Basketball

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Assessment and Analytical Framework for Sport Literacy: A Case of College Basketball

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Dedication

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Hyun Kyung and In Geol, my parents, who never doubted me for a moment.

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Assessment and Analytical Framework for Sport Literacy: A Case of College Basketball

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This dissertation aims to develop an analytical framework for measuring sport literacy from a case study of college basketball literacy. The dissertation is motivated by the recognition of the importance of sport literacy as an essential concept for fan development and the lack of empirical research on the development of an assessment tool. The goals of this dissertation are twofold: 1) to build a conceptual framework that explains the necessary components for sport spectating, and 2) to develop an assessment that can measure the sport literacy of college students. To accomplish these goals, I constructed two sequential studies within the context of college basketball. The first study proposes a conceptual model of sport literacy through a multiple case study design method (Eisenhardt, 1989). Data were collected from multiple sources including expert interviews, scenario plays, and documentary evidence. Multiple comparisons and inductive analyses allowed the discovery of relevant knowledge categories and components. In the second study, I developed a college basketball literacy assessment (CBLA). The instrumentation process was guided by the evidence-centered design method (Mislevy & Riconscente, 2006). Initially, 51 items were generated with the aid of six content experts including basketball players, coaches, and fans. These items were

reviewed by an additional group of experts to establish the content validity. Through the expert reviews and pilot testing, 40 items were finalized for the CBLA. A total of 382 responses from college students were used to evaluate the CBLA. Using the Rasch model, all 40 items were calibrated to examine psychometric properties of the assessment. The results supported the construct validity of the CBLA, showing acceptable unidimensionality, fit statistics, differential item functioning, etc. All except one item showed good fit statistics within the model. The results also demonstrated that the level of sport literacy has moderate and significant correlations with team identification and intention to watch the game. These findings prompt a re-thinking of developing strategies to recruit and retain spectators for a given sport. In conclusion, the results of this dissertation provide theoretical and empirical justification for developing the sport literacy assessment and highlight the importance of improving sport literacy as a solution for enhancing the intercollegiate sport spectating experience.

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Chapter 1: Introduction

The image of a father taking his son to a local baseball game and eating hotdogs while watching the game is a common scene in American society. It is at this type of outing that children begin to learn the basics of spectating baseball, including the rules of the game based as well as the rules of the fan experience. This kind of information gathering for a specific field (e.g., baseball) is a process of becoming literate.

"Literacy is the ability to read, view, write, design, speak and listen in a way that allows you to communicate effectively. The power of literacy lies not just in the ability to read and write, but rather in a person's capacity to apply these skills to effectively connect, interpret and discern the intricacies of the world in which they live." (Nelson, 2016, para. 1). Literacy has long been considered one of the most essential concepts of human development and is thought to be one of the most fundamental constructs for understanding human behavior (Gee, 2012; Geisler, 1994; Lankshear, 1997). Being literate adds value to a person's perceptions and experience in life. Social scientists across several disciplines continue to examine the best ways of identifying and improving 'literacy' for their fields of studies (Hirsch Jr., Kett, & Trefil, 1987; McKenna et al., 2013; Olson & Torrance, 2009; Shor, 1999), which provides the rationale for examining the role of literacy in a sport context.

BACKGROUND OF THE STUDY

Understanding sport as a literacy device has the potential to improve the life and experience of spectators and players alike. Sport provides benefits on both the macro and micro levels of our modern day society, as it fosters socio-economic development while also promoting individual health and daily lifestyles. By affecting a spectator's levels of motivation, enjoyment, and appreciation, sport becomes a universal language that enables

people to further learn and appreciate the rules and experiences of the game. This process fluidly transforms the average interested individual into a fully literate spectator, which is beneficial for the longevity of sport as a social construct within a society. In order to get those desired results, there should be a proactive catalyst that sparks the interest of the individual and a consistent need and desire for learning about the subject.

However, the concept of sport literacy is unclear to many, as researchers have proposed various definitions of this concept. For instance, Pill (2010, p. 33) defines sport literacy as "the capacity to put sport skills and knowledge to functional use for informed and engaged citizenship" which is grounded in the context of physical education. Sport literacy emphasizes sport knowledge as it enables an individual to appreciate sport games tactically and strategically, develop capacities to predict and decide game situations, increase positive motivation and enthusiasm toward sport participation, and value the rules, rituals, and culture of sport (Bryant et al., 1982). It also represents a developmental process of individuals in terms of their ability and competency regarding sport knowledge (Pill, 2010). The exploration of the functional capacity of differing levels of sport knowledge among the sport consumers is not a new concept. There are several perspectives that present frameworks of literacy with regard to sport experience. Sport psychologists, for example, have used various terminologies, like sport proficiency, competence, and ability, to represent the cognitive levels of sport literacy (Kerns, 1989; Harrison et al., 1999; Myers et al.; 2006; Myers, Beauchamp, & Chase, 2010). These terms are interchangeably used in psychology research but need to be further clarified to understand the role of sport literacy in a spectator context. Based on Kirsch and Guthrie (1977), sport literacy can be referred to as how well a person understands, communicates, and interprets sports. On the other hand, according to them, competency is more related to the ability to perform within a given sport, and lastly, proficiency refers to the level or

advancement of literacy of the sport. Thus, literacy itself, which is viewed as a more concrete concept but not much studied upon in sport, could become a better option in explaining sport spectating in comparison to competence or proficiency. Although research has started to address this cognitive aspect of sport participants, research on spectators using this cognitive framing is widely ignored. What we know, what we might know, and what we should know when spectating sport still remain as questions for sport practitioners and researchers.

The exact level of sport literacy needed is another difficult subject to tackle. It is fair to say that people need to be literate in sport in order to fully understand what they are spectating. Several studies reported that sport fans have a higher level of knowledge about their team, players, and sport, and that this knowledge increases their interest (Smith, 1988; Trail, Fink, & Anderson, 2003; Wann et al., 2001). However, some might argue that sport fans have different needs and motivations that do not include the necessity of being literate (Gantz, 1981; Bernthal & Graham, 2003). It could also be inferred that at some point being literate in sport creates a difference in the fan's overall experience. Based on expert-novice theory, there is substantial work demonstrating that the degree of ability or competency associated with comprehension and communication, better decision-making, accuracy, interpretation, and motivation can be applied in today's sport settings. However, we know very little about what constitutes the necessary components of being literate in sport spectating and how we should measure sport literacy.

Physical education scholars have taken another approach in order to have a better understanding of how students develop their sport skills and athletic abilities. For the most part, physical education literature has placed a focus on the students' performance and curriculum knowledge rather than focusing on content and/or contextual knowledge

pertaining to spectating a sport game (Arnold, 1979; Kirk, 2004; Pill, 2010). This is critical in sport spectatorship research in that it implies that sport consumers lack the chance to develop their literacy through classroom settings. Also, unequal opportunities stemming from the curriculum that students have in their schools can result in gaps in knowledge among sports and also continuously place prospective consumers as novices in sport spectating with little to no growth. Sport spectating is part of sport consumption but is unique in that it has been widely ignored and lacks a theory that could help develop it as a unique discipline. This perspective is an essential role that sport providers should develop for their sport and consumers to strengthen the basis and foundation of the sport.

The measurement of sport literacy is another important matter for practitioners to implement in their sport development frameworks. Although there is no assessment for measuring sport literacy, similar instruments do exist that measure the concepts of competency, proficiency, and knowledge, which provide us a sense of how to develop a valid instrumentation of sport literacy. The most common approach to measuring these concepts is a self-report type assessment, where a researcher asks for the relative degree of how well a person knows about a certain sport or his/her competence with the content of the sport. Although this type of questionnaire, which uses the Likert-type scale, can provide some information, this approach has several problems that have been criticized by measurement scholars. Common disadvantages of the self-report instrument are that include: the reported answers can be exaggerated, and that forget pertinent details can be lost, and may not be appropriate for measuring abilities or capacities that require details and objective levels on the developmental aspect. Also, using the total or average scores from the Likert-type scale presents several psychometric problems. Although self-report assessment is beneficial in efficiency, a more accurate method of assessing literacy is needed.

Another type of literacy assessment involves multiple-choice questions, in particular, in physical education settings where several studies adapted the set of questionnaires that comprised of asking rules, skills, etc. In fact, multiple-choice is the most efficient and widely used method when assessing learning progression in education, which presents its applicability in sport knowledge. However, currently developed questionnaires measuring sport knowledge that were mostly based on physical education curriculum cannot reflect/report contextual factors that are important in sport spectating. Sport spectating literature has reported contextual knowledge such as history, team and player information, culture, etc. in order to help understand sport games (Crawford, 2004; Mumford, 2013).

For several years, classical test theory (CTT) has been the leading method of measurement and instrumentation. In CTT, the assessment is based on the true score model, where a total score or an average score was often used to represent a person's ability (Suen, 1990). However, this conventional approach has numerous measurement problems: 1) item statistics (item difficulty and item discrimination) are only valid and valuable for samples where they are obtained; 2) sample and test item dependent problems which indicate comparisons of ability are only limited to the same set of test items; and 3) CTT assumes that all errors are equal for all score levels (Hambleton & Swaminathan, 1985). With the recent development of item response theory (IRT), the above limitations of CTT are easily addressed. The usage of evaluating questionnaire responses through scaling takes into account the notion that every item is not necessarily equally difficult, but each item has a different level of difficulty which assessments should be cautious of. Since this method is regarded as being superior to CTT, it is already widely used in educational settings such as the Student Achievement Test (SAT),

Graduate Record Examination (GRE) and Graduate Management Admission Test (GMAT).

PURPOSE OF THE STUDY

This study aims to provide a research foundation for sport literacy, specifically for sport spectatorship. The study proposes a conceptual framework for sport literacy and develops an assessment that measures a cognitive construct of sport literacy for spectators. The impetus for this study stemmed from recognition of the importance of sport literacy as an essential concept for spectator development. While sport knowledge, competence, and proficiency have been studied to assess sport participants' levels of understanding and performance, the existing frameworks fail to explain the layers of constructs regarding sport spectating. Most of the assessments were highly focused on how to play sport rather than how to watch sport. This requires a new perspective in capturing this aspect.

The study will shed light on the assessment and analytical framework that enables sport managers to assess sport consumers' literacy in a given sport context. The concept of sport literacy is developed using a case study of basketball literacy within college settings. The goals of this dissertation are twofold: (1) to build a conceptual sport literacy framework that explains the necessary components for sport spectating by utilizing the multiple case study approach recommended by Eisenhardt (1989); and (2) to develop an assessment that can measure the sport literacy of college students. To accomplish this, the study used Mislevy's Evidence-Centered Design (EDC) approach for assessment development (Mislevy, Steinberg, Almond, & Lukas, 2006; Mislevy & Riconscente, 2006). This approach provides a framework using a 'five layer' process in instrumentation: (1) domain analysis; (2) domain modeling; (3) conceptual assessment

framework; (4) assessment implementation; and (5) assessment delivery. The constructing process was followed, starting with clinical interviews with content experts such as basketball coaches, players, fans, and commentators to identify the key knowledge components that are necessary when watching a college basketball game.

The Rasch model, a type of IRT models, was employed to analyze the variability of student literacy and item difficulty, and also to investigate the validity and reliability of the instrument (Rasch, 1960, 1980). By applying the assessment framework, the literacy levels of college students' basketball literacy were examined. This study was designed to serve as a stepping-stone to help establish and develop assessments for sport literacy within any given sport. As a result, this study aims to achieve the following goals: (a) advance a more detailed understanding of literacy in sport spectating; (b) provide sport practitioners with concrete knowledge of how to improve sport spectators' literacy; and (c) develop sport management research by applying advanced measurement techniques that facilitate the use of these techniques in order to create a greater contribution to sport consumer literature.

Chapter 2: Review of Literature

This chapter discusses the field of literacy studies. In doing so, it particularly focuses on how the concept of literacy has been defined and developed over time and how this concept has evolved and can be applied to sport settings. Next, it looks at how the ideas of literacy can be used and applied to sport spectating. It then provides potential benefits of developing the concept of sport literacy based on the expert-novice theory. Finally, it discusses the relatively new methodology of item response theory, which serves as a tool for assessment development in this dissertation.

ORIGINS OF LITERACY

"For most of its history in English, the word 'literate' meant to be 'familiar with literature' or, more generally, 'well educated, learned.'" (UNESCO, 2005). Literacy has permeated and grounded itself within educational, curriculum development, and daily lifestyle settings. Just a few decades ago the conception of 'literacy' being part of mainstream education was nearly impossible for us to conceive and apply. 'Reading' and 'writing' were the main focus within the field during that time period (Bormuth, 1974), and they were deeply associated with the development of psychology and the teaching methods for learning processes within the curriculum (Resnick & Resnick, 1977).

Prior to the 1970s, the term 'literacy' was mainly used in casual, non-educational settings, especially when dealing with people who were illiterate (Olson & Torrance, 2009; Venezky, 2000). The negative connotation of 'literacy' was further instilled as programs were given this name as a means of teaching basic reading and writing skills to illiterate adults (Freire, 1970). Formal education settings saw the skillset of reading and writing as simple prerequisites for their courses. Curriculum, pedagogy, research, and debates occurring at the higher-level educational institutions were mainly focused on

reading and writing rather than 'literacy'. Also, functional mastery of these skills was considered to be essential goals for individual learning (UNESCO, 2005).

The definition and symbolism of 'literacy' drastically changed during the 1970s, from a term used in informal education settings to formal higher education environments. This change could be accredited to three main reasons: 1) the radical education movement from the late 1960s to the early 1970s; 2) a growing crisis of illiterate adults, and 3) an increase of interest for literacy studies in regards with sociocultural and social sciences (Freire & Macedo, 2013; Gee, 1991). It exponentially continued to encompass various practices and fields of studies to where it nowadays where it seems reasonable to deem any practice or knowledge of educational value as 'literacy' (UNESCO, 2004).

The plurality of literacy could be due to the multi-utilization of literacy throughout a community, society, and the life of an individual. The acquisition and usage of literacy differ for every individual depending on their culture, tradition, language, religion, and socio-economic status (Gee, 2012; Lankshear, 1997). This is why literacy has multiple definitions, compensating for varying purposes and situations, where the technical aspects of 'literacy' are irrelevant, whereas the social dimensions of 'literacy' are of greater importance (Gee, 1991; Olson & Torrance, 2009). Literacy research has become a common topic of interest throughout human science, and it is of little surprise that through the assimilation and acquisition of various disciplines the notion of literacy has completely changed. It is no longer a simple comparison between the literate and illiterate, the speech with the text, and the primitive with the civilized. Literacy has several differing cultural configurations and it holds value within institutional and political settings as well as theoretical and empirical research of every kind (Willis & Harris, 2000).

An example of this is ‘computer literate’ a term that is often just meant as someone who is proficient with the usage of a computer. Computer literacy is often understood as having a specific set of skills that allows an individual to understand and use a computer in a competent manner (McKenna, Labbo, Kieffer, & Reinking, 2013). Some other similar uses of ‘literacy’ can be found in ‘math literate’, ‘politically literate’, etc., where it has become part of our everyday terminology. This presents a general index of the definitional terms of literacy and its pristine placement of an educational ideal through its transformation during the past decades.

Today, the term ‘literacy’ is commonly used interchangeably with ‘competence’ or ‘proficiency’. Kirsch and Guthrie (1977) argued the importance of clarifying these concepts to develop precise measurements when assessing literacy achievement. According to their definition, functional literacy refers to ‘how well a person can read materials within survival activities’ (p. 505). On the other hand, functional competence refers to ‘the ability to perform adequately in a given situation’ (Rychen & Salganik, 2003, p. 43); functional proficiency refers to ‘the level or advancement in knowledge or skills that indicate the literacy of some individuals in given context’ (Chapelle, Grabe, & Berns, 1997, p. 141).

Through the inception of the new definition of ‘literacy’, the psychological reductionism of ‘literacy’ that has been imprinted into our society for more than a century has nearly vanished. Educators and researchers now approach ‘literacy’ as a term that has a larger focal presence in educational fields and that should have an even larger role with regard to the social sciences (Lankshear & Knobel, 2006; Olson & Torrance, 2009). This transformative trend can be observed in various fields of studies. Studies of concepts and ideals such as ‘cultural literacy’ (Hirsch Jr., Kett, & Trefil, 1987), ‘media literacy’ (Potter, 2004), ‘critical literacy’ (Shor, 1999), ‘literacy and technology’ (McKenna et al.,

2013), and 'new literacy' (Olson & Torrance, 2009) have been conducted and further examined.

An example is a growing interest in the US pertaining to literacy studies during the late 1980s, where cultural literacy was defined as having relevant knowledge that allows an individual to partake as an active and informed citizen of their community and society. Hirsch Jr. et al. (1987) believed that being culturally literate equated to being well informed about a cultural canon and being able to communicate about it in a social context in an effective manner. They stated that the growing number of culturally illiterate students was due to their lack of a common cultural stock and their inability to communicate it with their peers. So, in their standards, 'literate Americans' are those who possess cultural knowledge that is relevant to their societal environment.

Literacy is an ethereal and organic word that has changed significantly over time. Our modern-day understanding of literacy is far more geared towards academic fields of study; therefore, it is important for us to know the core definition of literacy and be able to apply it in various settings such as sports.

SPORT LITERACY AND SPORT SPECTATING

There is an argument that social forces such as urbanization, individualism, interpersonal, competition, technology, and geographical mobility created obstacles in the livelihoods of everyone's social ties with family, friends, neighbors, and peers (Irwin, 1977; Lofland, 1973; Melnick, 1993; Slater, 1990). Due to these phenomena, several people try to compensate for this lack of social interaction through less personal, less intimate, and private ways. It has been proposed that sport spectating has come into being as a source of entertainment and a gathering to enhance one's social psychological lives through quasi-intimate relationships (Coakley, Hallinan, & McDonald, 2011; Guttmann,

2013; Wakefield, 1995; Wann, Melnick, Russell, & Pease, 2001). This presents an interesting challenge for sport managers in the US as sport spectating can serve the two significant purposes of: (1) providing communal experience for individuals and (2) increasing their attendance. It is the finding of a balance between these two factors that can lead to the survival of a specific sport. Sport spectating is one of the several types of experiences that can be explained through interpretive frameworks, where people share what they know and see around them (Zillmann, Bryant, & Sapolsky. 1989). This shared knowledge facilitates consumption in a given context because it builds a mutual understanding, evaluation, and appreciation in the actions that are being consumed.

Knowledge in the sport context means more than just the linguistics or skills regarding sport activities. Especially for fans, knowledge is a medium for connecting them as a united entity through a sense of common commitment and shared references. Differing from strangers waiting in line at a bank or a grocery store, strangers in a sporting event inevitably share an enthusiasm for what is to come whether it is through gossip, cheering, or even silent waiting (Melnick, 1993). This shared interest creates a higher probability that the spectators would want to seek each other and create a sense of communal loyalty and trust that centers on a sport, team, or athlete. Through this willingness to interact with one another, fans have a greater possibility of learning and trading information about the sport and teams. This leads to their reputation of being 'walking encyclopedias' that can recite just about anything that pertains to their sport or team.

The concept of literacy within the sport context has been developed at the intersection of sport expertise, competencies, and proficiency focusing on sport performance. Most common interests in developing sport participants were methods in making individuals better perform a given sport by the physical education curriculum. It

could be compared with 'physical literacy'. Physical literacy refers to the ability to perform certain activities while sport literacy is more concerned with sport skills and knowledge that integrate into the game context to have better decision-making, accuracy, and interpretations. However, being literate in sport does not only mean how well people can perform in certain specific sports, but it rather means how people can be ready to enjoy the spectating activities including the basic rules, plays, and underlying culture. Sport knowledge for spectating has come into play to assess people's level of literacy when watching sport. According to Trail and Kim (2011), spectators are motivated by the values of the aesthetic scene of sport, lacking in knowledge of how sports work as constraints for their spectating. Of course, it can be argued that we can spectate sport with great enjoyment or satisfaction without knowing how to play the sport or doing it well ourselves, but there is potential that if we have higher levels of knowledge, it can induce or create more opportunities for diverse experience. The concept of 'mastery theory' can fit into the sport context. The more skilled or educated people have greater chances to enjoy the fun without constraints or barriers. Defining the term is thus 'sport literacy' significant for better understanding the level of knowledge of individuals for spectating.

DEFINITION OF SPORT LITERACY

The meaning of literacy has drastically transformed over the last few decades. According to UNESCO (2004, 2005), 'literacy' refers to "the ability to identify, understand, interpret, create, communicate and compute using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve his or her goals, develop his or her knowledge and potential, and participate fully in community and wider society". This notion of a conceptualized literacy that UNESCO (2004) presents did not just appear out of the blue.

It took more than three decades for the concept of the functionality of literacy as being 'varying' to instill itself in several fields of studies. Also, the concept of the 'plurality' of literacy and its 'continuum of learning' came to be rather acknowledged and researched upon. This third alliteration of literacy could be defined as a social dimension of literacy that has several literacies that span across various contexts.

Pill (2014, p. 57) defines sport literacy as the "functional use of sport knowledge for active and engaged citizenship". In accordance with the framework of Siedentop (1994), literate sport participants should be able to understand the culture, tradition, and rituals of a sport. The active participation and engagement of the citizens through their knowledge of the sport is the ideal definition of sport literacy by this study's standards. According to Pill (2010, p. 37-38), sport literacy should be addressed within four distinct understandings of sport knowledge: "(a) sport is an applied, practiced and situated set of skills; (2) sport creates embodied meaning, and meaning that can be communicated, interpreted, understood, imaged, and used creatively; (c) sport creates a 'text', which can be read for understanding; and (d) understanding sport requires a learning process". Within Pill's perspective, sport literacy does not only mean the functional ability in performing sport but it also means further applying it in settings in the individuals' life which can play an important role in developing one's life in general.

Sport literacy, according to Arnold (1979), within the physical education framework, is the integration of teaching and learning for a) the acquisition of sport skills that allows an individual to make specific decisions in an efficient and effective manner in gameplay; b) the recognition that sport is learned through various means and methods; and c) personal experience with sport is a process of learning sports itself. Although his framework only considers the performance aspect of sporting and focuses on the level of sport knowledge and skills, it can be applied within a spectating context where

understanding knowledge with regards to performing can be one of the core domains of sport literacy.

Sport literacy also embraces the multi-literacies theory, where the domain of knowledge learned from a specific field should enhance the individual's ability to further develop his/her knowledge base and engagement with his or her community and society (Healy, 2008; UNESCO, 2004). This means that the development of individuals' sport literacy can provide active engagement within a given sport culture and work as a stepping stone to continued sport learning in their sporting experiences.

In the literature, traditional sport literacy has focused more on the level of performing sport activities and its corresponding outcomes. However, literacy itself means the ability to identify, understand, interpret, create, and communicate within a given context and a sport spectating facet can be more appropriate for its usage. In this study, sport literacy is defined as 'understanding of context and content knowledge as well as the ability to read, analyze and interpret sport games and plays in a form that deepens the spectating experiences'. This functional use of sport knowledge may be more appropriate in a sport spectating context than an actual sport play context in which it encompass the meaning of being literate in general.

LITERATURE OF LITERACY IN OTHER AREAS

In literacy studies in linguistics, it is common to hear terms like 'oral literacy', 'visual literacy', 'information literacy', and 'media literacy'. It can be inferred that the term 'literacy' here means the ability to produce meaning, either as a creator or receiver from signals, codes, graphic images, etc. (Olson & Torrance, 2009).

Other types of 'literacy' such as 'science literacy' can be defined as being able to read or write purposeful and meaningful literature of science (Peña-López, 2012). This

concept is the closest to the ideology held by philosophers in the 1970s when talking about knowledge and academic disciplines. It was not until Hirst (1974) stated that 'forms and fields of knowledge' have their own 'languages and literature' when the perspective of 'literacy' started to change. In accordance to Hirst, Geisler (1994) argued that 'language' should be a collaboration of procedures, techniques, standards, and methods that are utilized by expert practitioners, where through 'language' one could be 'literate' in a given field of knowledge. Also, he highlighted two separate dimensions of knowledge, domain content and rhetorical process, as literacy components that involve problem-solving and transforming knowledge.

In recent times, 'scientific literacy' has been perceived as a composition of three specific scientific competencies: identifying scientific issues, explaining phenomena scientifically, and using scientific evidence. Scientific literacy in this state is not just about knowledge and skills, but rather about the ability to utilize that knowledge with appreciation in correlation with other domains of knowledge in any given scientific context. In the PISA science assessment (Peña-López, 2012), references are made to relevant scientific knowledge and skills of the students in correspondence with cognitive dimensions of certain scientific competencies. The usage of the term 'scientific literacy' instead of just 'science' in the PISA science assessment places and implies an importance on the application of scientific knowledge in real-life situations in comparison with traditional science curriculum knowledge.

Also, in regards with 'media literacy' or 'information literacy', it is often understood that it is the ability to learn how to 'read' media or information in a proficient manner in order to come to a rational conclusion that is non-biased or tampered (Koltay, 2011). With the development of technology, the mass production of information and knowledge through new media, 'new literacy' embraces those literacy concepts, further

encouraging people to critically analyze the given information. On top of these studies, various perspectives on conceptualizing literacy have their framework in defining core components and values. This enables us to have an in-depth understanding and design and develop programs and curricula of disciplines. There are underlying principles encompassing these studies of literacy that begin with what we know, what we might know, and what we should know pertaining to knowledge with contingencies.

SPORT KNOWLEDGE AND LITERACY COMPONENTS

The foundation of sport literacy draws on interwoven contexts framing the environment in which spectators participate. Before developing a theoretical framework for understanding the concept of sport literacy, it is necessary to begin with a discussion about the term 'knowledge'. The term knowledge usually stands for "facts, information, and skills acquired by a person through experience or education". In academic fields of study, it presents itself as a skill that people use in particular social situations in order to analyze and comprehend where they are and what they are doing (Clegg & Bailey, 2007; Hirst, 2010).

Within a sport perspective, the definition of sport knowledge is an indefinite term that has been used in two different ways to illustrate the core of sport usage. First, the common usage of questioning about the understanding of sport is the general background knowledge that is used in a certain specific sport or event regarding history, subculture, or game information; it, in short, pertains to context knowledge. Second, it is a type of knowledge that is used in physical education studies that pertains to the step-by-step instruction on how to play a particular sport, such as terms, rules, and skills/drills (French & Thomas, 1987; Iglesias, Moreno, Santos-Rosa, Cervelló, & Villar, 2005; Spilich, Vesonder, Chiesi, & Voss, 1979). Levine (1971, p. xxiv) noted that content knowledge is

"the needs, drives, and purposes which lead individuals to enter into continuing association with one another." However, the term "sport knowledge" has not been used as a concrete term in sport management research and needs to be clearly defined and developed especially for sport spectating.

The importance of knowledge and its role has already been largely recognized in various research areas. Especially, marketing studies since the 1970s have shown how consumers' cognitive dimensions are interactively involved within the process with regard to speed of pattern cognition, recall information acquisition, and information search behaviors (Bettman & Park, 1980; Corlett, 1991). Also, knowledge affects individuals' behavior, where the level of knowledge makes differences within decision-makings and consumption behaviors (Solomon, 2014).

Knowledge in the discipline of education represents the foundational knowledge such as facts or information for delivering intellectual proficiency and the academic performance of students. Of course, those with higher knowledge outperform those with lower knowledge for given specific tasks that can be applied in any sport context. By having a higher level of sport knowledge one can develop a better understanding of the sport.

Sport knowledge is a crucial factor for creating literate individuals in sport. It would ultimately lead to the accomplishment of sport developmental goals, improving both the quantity and quality of sport experience. According to Pill (2010), sport knowledge enhances the capabilities of individuals and communities in aiding one another in creating opportunities for understanding sport. In other words, individuals and communities are able to acquire, develop, sustain, and use relevant sport skills and knowledge through the fundamental training and support that reinforces their sport activities (Street, 2004). In this sense, sport knowledge will not only be an important

construct for sport spectating but also become a fundamental context for studying sport literacy. The next section will highlight the knowledge structure and domains based on literacy theories framing for sport literacy.

ORGANIZING THE DOMAINS OF SPORT LITERACY

Theoretically, knowledge representations may develop differently with expertise, but what makes the domain of sport unique? Thomas, French, and Humphries (1986) define the domain of sport knowledge as "a complex product of cognitive knowledge about the current situation and past events combined with a player's ability to produce the sport skill(s) required". However, this does not explain the importance of cultural, historical, and contextual aspects of knowledge that establish individuals' literacy within developmental and multi-literate perspective regarding sport spectating. Unlike domains investigated by cognitive psychologists, in sport, a successful appreciation of sport games may not necessarily correlate with successful execution of sport skills.

The definition of the sport literacy domain proposed here provides a continuum of learning in which individuals are deemed to be more or less literate in sport spectating; they are not regarded as either literate or illiterate in watching sport. So, for example, students with less sport literacy might be able to recall simple sport factual knowledge and be able to use common sport knowledge in analyzing or evaluating the sporting events. On the other hand, those with mode sport literacy might have the ability to connect the factual knowledge and use conceptual models to make predictions and give explanations, analyze the game plays, incorporate data as evidence, evaluate strategies, and communicate within the contexts. The scientific literacy assessment developed by PISA (Peña-López, 2012) provides a useful framework for organizing segments for sport literacy. The PISA assessment categorized scientific knowledge as (1) knowledge of

science, content for understanding the natural world, and (2) knowledge about science, central process of science and explanation of context. In addition, scientific competencies involve higher order cognitive processes, meaning transforming and applying knowledge within a given context. This framework also considers attitude toward science, interest, appreciation, and response to science, as belonging to one of the literacy domains, but we excluded this domain because it can also be interpreted as an outcome or end product of an experience that sport spectating offers.

The physical education framework can also be used as another source for establishing the domains of literacy. In physical education curriculum, a conceptualization of the literacy domain includes the consideration of content knowledge as part of education (Arnold, 1979) and context knowledge characterized by the background knowledge that enables a better understanding of sport itself (Siedentop, 1994).

Adapted from the scientific literacy framework and traditional knowledge framework (Peña-López, 2012), sport literacy may be characterized as consisting of three interrelated aspects: (a) content knowledge: understanding the nature of sport itself that includes rules, skills and drills, etc., (b) context knowledge: recognizing sporting event background knowledge including historical, cultural, etc., (c) competencies: internalized knowledge of a sport that a spectator possesses and that enables the spectator to read the plays, identify and communicate (interpret and explain) sport game and issues. Compared to content knowledge literature, context knowledge and competencies in sport spectating have been scarcely investigated in terms of finding the actual components that should be appropriate for the research at hand. In order to establish the sport literacy framework, three questions regarding these domains should be addressed:

1. What content knowledge should we reasonably expect spectators to be equipped with?

2. What context knowledge should we reasonably expect spectators to be equipped with?

3. What competencies should we reasonably expect spectators to demonstrate?

In addition, the three questions above should be addressed to identify the level of knowledge that the individuals need in order to become literate. Both epistemological and aesthetic knowledge can play an important role in assessing the literacy levels by obstructing spectators from the rhetorical process of spectating. As noted by McPherson and Thomas (1989), the level of sport knowledge correlates with expertise, which becomes important that it explains not only individuals' cognitive and behavioral development but also supports learning theories in education.

EXPERT-NOVICE THEORY

Understanding qualitative and quantitative differences of cognitive structures between experts and novices provides a basis for identifying the developmental process of sport spectators. Knowing the difference between experts and novices is not a new concept in understanding individuals' cognitive development. It has already been developed in several areas of studies such as education (Chi, Feltovich, & Glaser, 1981), nursing (Benner, 1982) and management (Sujan, 1985) since the 1980s. Especially, the theoretical works of this concept were founded in educational fields, specifying the cognitive aspect that explains the development of human capacity, knowledge. It is true that there is a stark contrast between experts and novices when it comes to spectating sport games. The experts have more relevant core knowledge, central constructs, and utilize a variety of methods to use that knowledge. Novices, on the other hand, tend to possess shallow and separate knowledge structures, preventing them from comprehending a given sport.

According to schema theory (Sweller, Van Merrienboer, & Paas, 1998), a complex schema is constructed by incorporating a large number of interacting elements into a single element. Schema construction is formed through the merging of lower level schemas into one or more higher-order schemas. While novices may have significantly lower level knowledge structures, experts can perceive those as a single entity, which is due to the degree of connections of the knowledge items. The corresponding ability allows experts to better perceive a grouped meaning of patterns from information and acquire more thematic knowledge. In contrast, novices have a lower sensitivity in recognizing the relationship between patterns. For example, Chase and Simon (1973) showed that expert chess players could not only identify isolated patterns but also recognize an integrated configuration of chess piece positions. Experts garner more meaning from the present information and interpret the information to form associations with its knowledge structures (Chi & Ceci, 1987), which allow them to envision points of the game through key patterns.

Kozma and Russell (1997) provided the underlying principles on how individuals extend their knowledge in gradual chunks and how they store and recall them. They argued that the difference in the amount of prior knowledge could account for the difference in task-specific performance between experts and novices. Sweller et al. (1998) also asserted that individuals' intellectual proficiency comes from their knowledge and experiences stored within long-term memories.

Singer and Janelle (1999) summarized the characteristics of being an expert in sport: experts 1) have greater knowledge, 2) interpret greater meanings from available information, 3) store and access knowledge more effectively, 4) make better predictions around situational probabilities, and 5) have rapid and more appropriate decision-making.

Understanding the differences between experts' and novices' expertise would provide insights as to how to expand and refine spectators' knowledge structures.

Several expert-novice studies have been conducted in various sport settings (e.g., baseball, volleyball, tennis, etc.) to examine how individuals perceive the problem at hand, find solutions, and implement strategies (Dodds, Henninger, Patton, Pagnano, & Griffin, 2003; French et al., 1996; McPherson, 1993, 1999; McPherson & Thomas, 1989). These studies used instructional set and coding procedures to examine players' tactical knowledge development within given contexts. They found out dramatic differences between experts and novices regarding knowledge generation and actions. The rate of accurate responses given by the experts allowed them to actively engage with the game while novices only presented enough knowledge and response-rates to actively spectate the game (McPherson, 1999). Experts tend to know a specific solution for every situational problem while novices try to resolve them through 'general' solutions (McPherson & Thomas, 1989). This may increase the intellectual dexterity and interpretation of the sport scene or plays that help spectators' in-depth understanding of the sport. Also, experts have the ability to store relevant information for long-term use and retrieve it when needed while novices do not possess this ability and sometimes struggle to even compartmentalize the information in an organized manner (French et al., 1996).

In accordance with the expert-novice theory, it is evident that understanding and developing consumers' domain-specific knowledge can play a role in facilitating learning motives and finding out what they should know about (Chiesi, Spilich, & Voss, 1979; Griffin & Placek, 2001). Due to the difficulties in isolating and researching the complex nature of learning processes in sport, practitioners and researchers need to establish the

kinds of sport knowledge that spectators obtain and the connections/interactions between them when watching sport games (Dodds et al., 2003).

IMPORTANCE OF SPORT LITERACY

One of the prime benefits of being literate is the potential for increasing the interest of spectating and corresponding behaviors, which is important for sport managers and sport development practitioners. Interest is a crucial component between cognitive and affective issues through a traditional learning model process, where personal and situational interests greatly influence knowledge acquisition (Hidi, 1990; Renninger, Hidi, & Krapp, 2014; Schiefele, 1991). Physiological, cognitive, or affective interest eventually leads behavioral corrections of passive attention to active search and devout researching. This is important in the fact that acquired information creates an endless loop of continuous interest and search which leads to a broader expansion of an individual's knowledge base (Wilson, 1999).

According to the definition by Deci and Ryan (1985), interest has a crucial and innate role in creating a motivated behavior that compels people to be inclined to a certain activity. More specifically, individual interest has both positive and affective traits that prompt cognitive or behavioral outcomes within a given context (Bergin, 1999; Hidi, 1990). Various previous studies examined the relationship between cognitive domain and affective domain, explaining how individuals' knowledge affects their interest in learning (Alexander, Jetton, & Kulikowich, 1995; Alexander, Kulikowich, & Jetton, 1994; Tobias, 1994).

Affective-cognitive consistency theory supports this relationship in which the affective dimension positively changes by providing new information or knowledge (Millar & Tesser, 1989; Norman, 1975). This theory also suggests that these changes may

vary due to the degree of knowledge and the persuasive and comprehensive nature of it within given topics (Zimbardo & Leippe, 1991). According to Holt (1993, p. 113):

> The satisfaction varies according to both the spectator's competence with the local framework of baseball and the complexity of the action or object to be accounted for. For a given spectator, the more complex the account, the more satisfying the experience… For a novice spectator, even the simplest accounts can be very satisfying, while for an expert, accounting provides little satisfaction except in situations of rare complexity.

Kintsch (1980) hypothesized that the relationship between interest and prior knowledge would be an inverted U-shape, where moderate levels of knowledge would create a greater degree of interest than higher or lower levels of prior familiarity. He stated that interest would be low when there is little to no relevant knowledge. Interest would then increase as an individual learns enough about the topic to relate it to a difference schema, but it should dwindle when the knowledge has reached the point where nothing new could be learned. This formulation is further supported by Hidi and McLaren's (1991) similar findings within their studies on writing.

Even though no relevant studies were found in sport settings, research on the varying difference of interest between experts and novices would help provide insight as to what the shape may be for the interest-knowledge relationship within the sport. It is apparent that experts in any field would have higher interest than the general public through a display of devotion and tenacity in active participation related to their field of expertise. This then contradicts the previously stated notion that the relationship between interest and knowledge is an inverted U-shape.

Knowledge does not just lead to affective changes in the individuals. It is stated that prior knowledge significantly affects the participation levels of individuals' engagement and high order thinking (Ogan-Bekiroglu & Eskin, 2012). In an example, students have spoken about how their knowledge of business concepts grew after the

completion of a course where they were required to apply the theoretical concepts to real-life practices. Students have stated that the knowledge gained from experiential-based practices created opportunities for them to reinforce introductory concepts. Even though the research found a correlation between active engagement and knowledge gained for students, there were no significant findings among the different levels of interests of the students for the subject matter. These results contradict the hypothesis of Kintsch (1980), there is an inverted U-shape relationship between interest and knowledge. It implies that introductory courses through the integration of pedagogical approaches can lead to achieve greater student engagement and higher quality of learning.

Another benefit of being literate in sport could be explained through a motivation model that entangles knowledge as a subdomain of the motivation construct. In this model, knowledge is an antecedent component which leads to perceived competency and the level of performance that ultimately retain sport participants from certain sport settings (Boiché & Sarrazin, 2009; Fraser-Thomas, Côté, & Deakin, 2008). The increase in competence may strengthen the vulnerability of dropouts in that we could expect literate spectators to be retained in our sport game and events. Although this connotation seems straightforward, there is no analytical framework for understanding the specific components of sport literacy. Several sport consumer behavior studies (Kim & Trail, 2010; constraints; Trail & James, 2001; motivation) stated knowledge as a sub-domain of those constructs but failed to grasp the actual knowledge of spectators. For example, Trail and James developed the knowledge items by only asking whether people track the sport statistics (team or player stat and record) to further analyze the spectators' motivation. Also, Kim and Trail used this construct (lack of knowledge) by asking whether people know the rules or strategies with three broad and ambiguous questions. However, as the knowledge spectrum varies by individuals and their effects differ by the degree of

understanding, literacy should be considered as a necessary construct for sport management literature that needs further investigation with regard to knowledge.

FRAMEWORKS OF LEARNING PROGRESSION

To construct a feasible and measurable concept of sport literacy, Bloom's taxonomy has been revisited. Bloom's taxonomy describes a set of educational learning objectives, which clarifies the levels of complexity and mastery through a learning process (Bloom, 1956; Fink, 2003). The taxonomy model assumes that "wholes can be broken into parts, that skills can be broken into sub-skills, and that these skills can be sequenced in a learning line" (Fosnot & Perry, 1996, p. 8). It has been widely adapted to effectively design and improve learning activities and used as a framework for evaluation of a learner's progression (Anderson, Krathwohl, & Bloom, 2001; Lalley & Gentile, 2009; Levine et al., 2008).

In this model, the cognitive domain has been categorized with six hierarchical mechanisms of learning: (a) knowledge, which describes the recall or retrieval of previously learned information; (b) comprehension, which involves understanding the meaning, translation, and interpretation of materials; (c) application, usage of a concept in a new situation or problem; (d) analysis, which refers to the ability to separate materials or concepts into components in order to understand the overall structure; (e) evaluation, which relates to the judgment given to specific materials; and (f) synthesis, which involves combining elements to form new ideas or structures (Bloom, 1956). Each category represents a level of learning progression and all these six categories together have a sequential process. Bloom provided examples so that it is easy to conceptualize the potential use of the model in relation to the field of user's interests. Bloom's

examples are also highly visible and adaptable so that they are easy to apply in a complex curriculum such as sport education.

Although this model has been highly appreciated and has been continually used in practice, educational scholars have criticized it. This has resulted in the creation of modern revisions (Fink 2003; Levine et al., 2008). Fink (2003, p. 29) noted, "individual and organizations in higher education are expressing a need for an important kind of learning that does not emerge easily from the Bloom's taxonomy". Fink addressed the need of a new kind of learning beyond the cognitive domain provided in Bloom's model, suggesting a new taxonomy of learning, 'taxonomy of significant learning' (Fink 2003). Fink's taxonomy involves six components: (a) foundational knowledge, which indicates the "knowledge" that a student should know; (b) application, which refers to the ability to apply the "knowledge"; (c) integration, which describes the ability to understand the connections between "knowledge" and other things; (d) human dimension, which addresses the learning outcome in relation to the learner' vision in society; (e) caring, which is created from the learning experience; and (f) learning how to learn, which indicates the metacognition, resulting with an independent learner. Fink (2003, p. 32) also ascertains that "if students learn how to apply content and see connections with other content knowledge, understand the human implications of what they have learned, and come to care about learning how to keep learning, it may be possible that they will both retain what they have learned and continue to utilize the concepts". This approach provided an implication of how to apply a learning model into a sport management framework.

While these taxonomy models were adopted in diverse disciplines such as biology, psychology, education, and even the medical field, the models employed in sport settings are very limited and unexplored. Perhaps this is because these models rely on the

learner's metacognition or self-awareness of growth, both on an academic and individual level. Also, this may indicate that there is a weakness in understanding foundational knowledge components that capture the spectators' significant learning. To date, there is no research that applies these taxonomy models within a sport context.

ASSESSMENT OF SPORT LITERACY

The continuous growth of varying theoretical and empirical approaches parallels the ever-expanding growth of literacy. However, recent research has focused on the distinctive qualities of sport participation rather than understanding, interpretation, communication, expression, and other competencies within sport spectating. Also, there is a dearth of literature assessing sport consumers' knowledge on how literate they are. The goal of this research study is to find an exact understanding of the literacy concept and to establish an analytical framework for assessment in a sport context. Even though it is precarious to state a distinct difference between general literacy skills and higher level specialized domains of knowledge accessible only through literacy, there is an overwhelming consensus that a general competent level of sport spectating. Being a sport expert can be learned and could be applied to any sport context such as sport event, sport broadcasting, participation, etc. This general conception of sport expert knowledge has been the driving force for developing sport literacy studies and related sport education strategies.

Only a few studies to date have examined sport literacy, but similar concepts such as proficiency, expertise, competency, and knowledge classify the proficiency levels of sport participants (Kerns, 1989; Harrison et al., 1999). Common modes of assessment are examining the knowledge of learning from a school curriculum, regarding skills and drills using multiple-choice type questions (Falmagne et al., 2006; McPherson &

Thomas, 1989). Within physical education literature, both 'observation approach' and 'knowledge test approach' were used to assess students' level of development. A case study by McPherson and Thomas (1989) based upon the development of knowledge and sport performance among tennis players led to the creation of a paradigm and structure of examining players' cognitive knowledge (present and past) and how it influenced their decision-making abilities. They created a protocol structure to further analyze players' responses when faced with hypothetical obstacles and situations in a game. However, this framework of assessing sport knowledge cannot account for the contextual aspect of knowledge, which can be an important aspect of the spectator sport. They drew example knowledge categories from interviews with tennis players indicating 'condition concepts' (e.g., players' physical condition, play or position style), 'action concepts' (e.g., serve skill, return of serve, drop/passing shots, etc.), and 'goal concepts' (e.g., winning the point, executing the skills, etc.). However, the study only provided relative knowledge among experts and novices from interviewed texts that were limited as for further statistical inferences.

More traditional types of knowledge assessment could be found in the study of French and Thomas (1987). They used a questionnaire to assess children's basketball knowledge to examine the relationship between knowledge and performance. The 50 knowledge items were constructed based on the knowledge framework of 'declarative knowledge' and 'procedural knowledge' (Anderson, 1982). While the structure of declarative knowledge is defined as the knowledge of factual information such as rules and terminologies, procedural knowledge refers to the methods of completing a task that exhibits the ability in a given sport context. Examples of items include knowledge of the rules, the goals and action of the game, and offensive and defensive strategies. They also used an observation instrument developed by McPherson and Thomas (1989) that scores

coded from 0 to 2 to assess the level of understanding and skills. In addition to these 'knowledge test' type assessments, several studies used written type questionnaires to assess the sport knowledge (van Vuuren-Cassar & Lamprianou, 2006; Dexter, 1999). Content areas were allocated based on their relative importance; the domain of technique was given 40% of the marks and tactics with 30%, and rules with 30% respectively.

In terms of measuring sport competence, the Physical Self-Perception Profile (PSPP) (Fox & Corbin, 1989) was frequently used in measuring self-esteem levels, which correlate to sport performance from various sport contexts (Barnett et al., 2008; Barnett, Morgan, Van Beurden, Ball, & Lubans, 2011). Within this scale, competence was conducted through a 4-point alternative format, where a student has to choose one of four choices that best describes their competency whether it is 'not true' or 'really true'. Every item had a scale of 1 (low self-perception) to 4 (high self-perception). Example questions in the sport competence subscales are 'some people are good at most sports', 'some people seem to learn sports skills very slowly', and 'some people feel very confident when it comes to playing sport'. Based on the Fox and Corbin's PSPP, Whitehead (1995) developed items for the sport competence for children. This assessment is composed of six items with 5-point Likert-type scale asking how children identify their competence with questions such as 'do some people feel that they are good when it comes to playing sports?' or 'do some people are quite confident when it comes to taking part in sports activities?'

Another examination of sport competence was on youth sport, applying Harter's (1982) Perceived Competence Scale (PCS), composed of three subscales of cognitive competence with academic focused, social competence, and physical/sport competence in a 4-point structure format (Klint & Weiss, 1987). According to Harter (1982) and Klint and Weiss (1987), physical/sport competence was asked through questions about how

people perform well at sports, good enough at sports, and prefer to play sport. However, although self-reporting is the simplest and the most inexpensive method, both instruments (i.e., the PSPP and PCS) have inherent psychometric limitations. This approach can cause inaccurate results because the respondents' answers are reflective of their nature, including self-biased opinions, which come from self-observation.

Several studies have reported that these types of assessment are not sufficient to be a reliable measure due their inherent subjectivity. In the previously developed assessments within the sport management discipline, knowledge assessments for sport literacy were not based on 'theories' and 'practices' for testing but rather conducted in a non-scientific way. In order to enhance the precisions, we need to identify actual components regarding what spectators should know and to develop questions in a corresponding manner. The ideas presented in the explanation of sport literacy here are based on the assumption that learning is the primary function of sport spectating. The development of the conceptual framework for a sport literacy assessment should address this special knowledge with regard to spectating.

CLASSICAL TEST THEORY AND ITEM RESPONSE THEORY

Currently, there are two popular measurement frameworks when developing an assessment. They are (1) the Classical Test Theory (CTT) and (2) the Item Response Theory (IRT). CTT, a standard approach using total scores, has been dominant for the past several decades because it requires relatively weak theoretical assumptions that could be easily applied in measurement practices (Bond & Fox, 2007; Boone et al., 2014; Hambleton & Jones, 1993). However, this approach has several limitations that are addressed by measurement scholars. The major problems of this approach are person-item dependence and item-person dependence. For example, under CTT a person's

ability would be higher when one took an assessment with easy items. If that person took another test which is a difficult test, then that person will have a lower ability score. This implies that the individual's ability is dependent on the difficulty of the test. It causes difficulty in determining which scores accurately reflect the person's ability. However, we believe that a valid assessment should be able to measure the exact ability level of an item, not depending on the test takers.

To compensate for the limitations that CTT possesses, IRT was developed. IRT has two distinct advantages of invariance of ability and item parameter over CTT. Unlike the single point test system of CTT, IRT is self-sufficient from testing, relying on the weight of the items. This means that IRT can be used to analyze one's ability level through items rather than a test. Also, IRT is independent of sample restrictions, meaning that item parameter estimates (e.g., item difficulty, item discrimination) of examinees are not dependent on specific characteristics to answer specific items, called 'parameter invariance'. Another advantage of IRT is that it focuses on individual items, allowing it to have the capability to link items and examinees on the same latent scale. Lastly, IRT provides statistics on an examinee's ability level to precisely respond to a specific item (Bond & Fox, 2007; Boon et al, 2014). This allows us to create standards of errors for examinees of various ability levels. The nature of IRT has allowed us to have liberty and creativity in item selection, creating item banks, making tests, comparisons of scores from various tests and test administrators, analyzing differential item functioning (DIF), and using new testing methods such as computer adaptive testing (Embretson & Reise, 2000).

IRT has been further developed and applied in educational and psychological assessment development as an alternative framework for measuring latent construct (Boone et al., 2014). The Rasch model is one of the dominant IRT models, particularly

for binary items (correct and incorrect) in psychometrics. It is proposed by George Rasch to assess the latent traits through the responses of test takers and the quality of the test (Rasch 1960, 1980). It is founded in a mathematical model that uses the probability of a correct response to an item, which indicates that the model considers the item difficulties. This approach assumes that a person will be able to answer items correctly depend on his or her ability. For example, if a person has a higher ability then he/she can correctly answer on a difficult item) as well as an easy item. Likewise, a person with a low ability can correctly answer an easy item, but not a difficult item. These difficulties are represented in the item characteristics curve (ICC) (see Figure 1) in which the probability of correctness functions with a person's ability on a latent trait. In Figure 1, the horizontal axis indicates the range of ability, which is standardized, that ranges from approximately -6 to 6 logits, where a value of zero indicates a moderate level of ability. The vertical axis shows the probability of a correct response to each item. By considering the item difficulty, the assessment can accurately estimate the test taker's own latent ability.

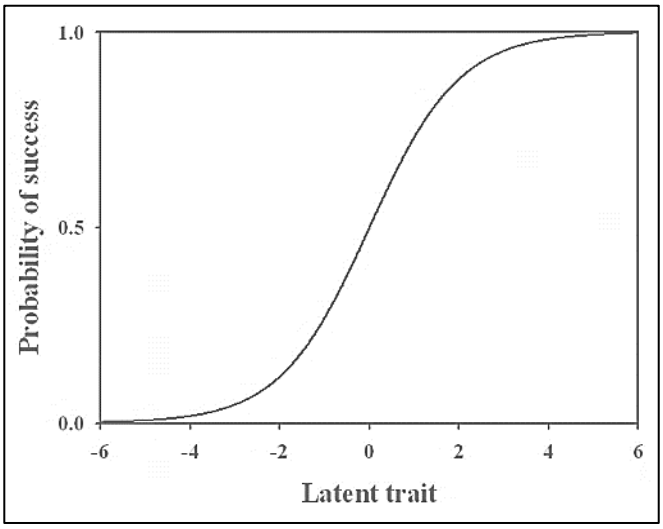

Figure 1. Item characteristics curve (ICC) of the Rasch model

While the IRT model, or the Rasch model, presents itself as a superior substitution to the CTT model, it suffers from three main disadvantages/limitations. First, IRT requires stronger assumptions about the data to which the model is applied than CTT (e.g., sample size, unidimensionality, and local independence). Unidimensionality stands for a single structure construct, all items should measure a single trait. It can be checked by scree plot or principal component analysis of standardized residuals. Local independence can be understood, as the observed items are conditionally independent to each other on the assessment. Disregarding these assumptions can lead to drastic overestimation of item information, which further inflates the estimation of the traits. Additionally, the IRT models are complex in their validation. The fit between the item response models and the test data need to be examined because invariant of item and ability parameters will not hold if the IRT model does not fit the data (Bond & Fox, 2007). For this study, the Rasch model was utilized to assess college students' sport literacy in college basketball games as a measurement model. The detailed measurement steps of the Rasch dichotomous IRT model are described in the method section of chapter 4.

Chapter 3: Building a Sport Literacy Framework (Phase I)

The first phase of this dissertation seeks to answer how to develop a conceptual framework that explains the sport literacy of sport spectators. A particular research question addressed here is 'What are the knowledge, domains, and components that comprise sport literacy for spectators?' Traditionally, theoretical frameworks are developed through synthesizing previous literature, common knowledge, and experience. However, there is little existing research on sport literacy. This study employs Eisenhardt's (1989) multiple case study method, a qualitative approach, to construct theoretical categories grounded in spectators' experiences and subsequently analyze sport knowledge components that are necessary when watching sport games. According to Eisenhardt (1989), a multiple case study method is a useful approach when developing or generating a new theoretical framework. It is an inductive approach that promotes a better understanding of the issues or topics through analyzing the research data collected through multiple methods such as archives, interviews, and observations. The analyzing process of this method is somewhat similar to multiple-case study experiments, allowing the examination of processes and outcomes between cases (i.e., subjects) that follow replication logic. By focusing on the spectators' experience, the method aims to account for a pattern of constructs that is relevant to sport spectating. The study has aided in the formation of general categories and provided further explanations and descriptions of issues that were developed. Through this qualitative approach, the study elucidated unique domains about the literacy of sport spectating and components, providing valuable information to increase the level of enjoyment and learning process. Besides, the results of this study serve as a framework for developing valid items for sport literacy assessment, which is another goal of this dissertation.

RESEARCH QUESTIONS

The study mainly focuses on identifying the necessary knowledge components that contribute to the enjoyment and aesthetics of the sport spectating experience. The central research questions guiding this study were:

RQ1: Why sport literacy matters?

RQ2: What are the components for being literate in watching sport?

RQ3: How can this literacy be developed?

METHODS

In this study, the guidelines proposed by Eisenhardt (1989) were utilized: 'the process of conducting theory using case studies'. This guideline was synthesized and developed from previous works of qualitative methods (Miles & Huberman, 1984), the design of case studies (Yin, 1981, 1984), and grounded theory (Glaser, 1978) providing a roadmap that aids in the design of a multiple case study in a social science context (see Table 1).

Table 1. Process of building theory from case study research (Eisenhardt, 1989, p. 533)

Step	Activity	Reason
Getting Started	Definition of research question	Focuses efforts
	Possibly a priori constructs	Provides better grounding of construct
Selecting Cases	Neither theory nor hypotheses	Retains theoretical flexibility
	Specified population	Constrains extraneous variation and sharpens external validity
	Theoretical, not random, sampling	Focuses efforts on theoretically useful cases-i.e., those that replicate or extend theory by filling conceptual categories
Crafting Instruments and Protocols	Multiple data collection methods	Strengthens grounding of theory by triangulation of evidence
	Qualitative and quantitative data combined	Synergistic view of evidence
	Multiple investigators	Fosters divergent perspectives and strengthens grounding
Entering the Field	Overlap data collection and analysis, including field notes	Speeds analyses and reveals helpful adjustments to data collection
	Flexible and opportunistic data collection methods	Allows investigators to take advantage of emergent themes and unique case features
Analyzing Data	Within-case analysis	Gains familiarity with data and preliminary theory generation
	Cross-case pattern search using divergent techniques	Forces investigators to look beyond initial impressions and see evidence thru multiple lenses
Shaping Hypotheses	Iterative tabulation of evidence for each construct	Sharpens construct definition, validity, and measurability
	Replication, not sampling, logic across cases	Confirms, extends, and sharpens theory
	Search evidence for "why" behind relationships	Builds internal validity
Enfolding Literature	Comparison with conflicting literature	Builds internal validity, raises theoretical level, and sharpens construct definitions
	Comparison with similar literature	Sharpens generalizability, improves construct definition, and raises theoretical level
Reaching Closure	Theoretical saturation when possible	Ends process when marginal improvement becomes small

Getting Started

Eisenhardt (1989, p. 536) noted: “An initial definition of the research question, in at least broad terms, is important in building theory from case studies”. The rationale for defining the research question not only helps in collecting relevant data systemically but also presents the study from being overwhelmed by volumes of data. This study intends

to probe the concept of sport literacy that explains the knowledge levels among spectators.

Eisenhardt suggested that a prior specification of constructs could help in designing protocols that result in more accurate measures of the constructs. From the review of scientific literacy research (Peña-López, 2012) and relevant studies in sport literature, 'content knowledge', 'context knowledge', and 'competency' are used as a tentative framework for exploring the concept of sport literacy (see Figure 2). This framework permits specific research questions that explicitly probe the elements of sport literacy during the interview: 1) what content knowledge might we reasonably expect spectators to be equipped with? Or what are the rules and skills that are required for understanding sport games?; 2) what context knowledge might we reasonably expect spectators to be equipped with? Or what factors (e.g., history, statistics, teams, players, etc.) are enhancing the level of enjoyment for spectators?; and 3) what competencies (i.e., sport literacy) might we reasonably expect from spectators to demonstrate? However, these research questions under tentative constructs were only used as a guideline that is not limited to this framework and adjusted and revised in accordance with the findings.

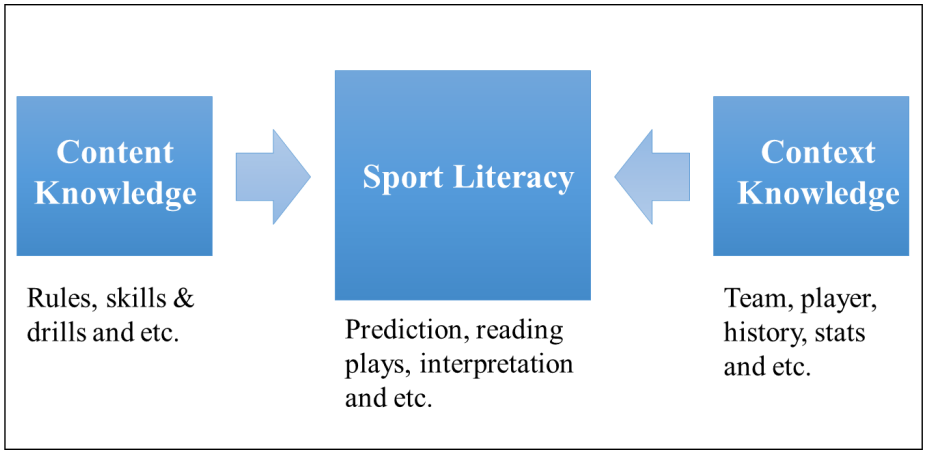

Figure 2. Tentative sport literacy framework (adapted from Peña-López, 2012)

Considering the research questions listed, this study explores the conceptual framework using men's college basketball literacy as a case. Men's college basketball was chosen for following reasons: 1) southwestern region, where basketball is known to be less popular than football in competitive collegiate sport settings; 2) requests from university athletics for developing curriculum, programs, and assessments; and 3) accessibility of gathering the rich amount of data from experts.

Selecting Cases

Selection of cases, which are key informants, is the most important step in a case study method when building a theoretical framework from grounded data. An appropriate selection of population is crucial because it directly affects data collection that controls the validity and quality of the findings (Strauss & Corbin, 1990). The individuals interviewed in this study were content experts who have a comprehensive and authoritative knowledge of skills in college basketball (see Table 2). They were composed of basketball coaches, players, sport analysts, and devoted fans who provided the fruitful explanation of game experiences that focuses on clarifying the domain of sport knowledge. A theoretical sampling method, purposefully selected cases from a population, was used to fill theoretical categories of sport knowledge and provide examples of knowledge content where the goal of the theoretical sampling is "to choose cases which are likely to replicate or extend the emergent theory." (Eisenhardt, 1989, p. 537). The theoretical sampling method started with contacting individuals from the University of Texas Athletics who had been identified as former basketball players with college basketball professions. Participants were asked to share their experiences and understandings when watching college basketball games. Then, theoretical sampling

continued in a snowball fashion, recruiting other individuals who were identified as experts by following criteria.

Content experts were qualified in the study if they were: (a) affiliated with college basketball; (b) former players/coaches; and/or (c) devoted fans with more than 10 years of spectating experiences or education in basketball who have high knowledge of and consider themselves a "fan" of college basketball. Participants were screened via telephone or email through a simple, informal survey (verbal or written) to exclude those who do not speak English. There is no preference for their gender, race, and socioeconomic status for the recruitment, further encouraging diversity within the sampling.

In the majority of grounded theory approach studies, a larger subject pool is deemed necessary for saturation of the data, but in this case study, relatively little is known or researched upon about spectator knowledge in college basketball, allowing for a smaller sample size of experts, mainly 10-15 participants, to provide enough information and data in order to create a specific framework or model (Charmaz, 2006). Table 2 shows the characteristics of the final research participants.

Table 2. Characteristics of interviewees

Pseudonym	Age	Gender	Playing Level	Yrs. in Playing	Yrs. in Spectating	Ethnicity	Fan Affiliation
Alex	20-30	Male	HS Varsity	12	15+	Caucasian	UT Austin
Andrew	20-30	Male	JR High	4	10+	Caucasian	UT Austin
Bryan	20-30	Male	HS Varsity	10	12+	Caucasian	Duke
Chris	20-30	Male	D-I CBB	12	15+	Caucasian	Duke
David	20-30	Male	AAU	10	12+	Hispanic	UCLA
Hunter	20-30	Male	HS JV	10	12+	Caucasian	UNC
John	45-50	Male	D-I CBB	20	25+	African-American	GU/ UT Austin
Joshua	20-30	Male	Youth/Fan	3	15+	Caucasian	UT Austin
Michael	20-30	Male	D-I CBB	8	10+	African-American	UT Austin
Peter	50-60	Male	D-I CBB	10	30+	Caucasian	Syracuse/ CU
Steve	30-40	Male	HS Varsity	6	10+	Hispanic	UT Austin
Steven	20-30	Male	Youth/Fan	2	8	Caucasian	UT Austin

Note: UT = University of Texas, UCLA = University of California at Los Angeles, GU = Georgetown University, CU = University of Colorado.

Crafting Instruments and Protocols

This step describes the data collection methods. In this qualitative approach, a combination of interviews, observations, and archives were used to collect relevant sources of data. The multiple case study calls for in-depth responses from interviews, where the goal of this approach is to have rich descriptions and to keep the participants focused on the given topic as well. This study employed a semi-structured interview approach with guided questions that accounts for and cancels out researcher bias. Individual interviews were conducted by face-to-face interview. The interview began with checking the background information of the participants regarding history, experience, education, etc. of basketball. Then, broad and open-ended questions regarding sport spectating experiences were asked to elicit in-depth responses from the participants, for example, “What is your most memorable or enjoyable moment when

watching college basketball?" or "What makes you keep on watching college basketball? Follow-up questions used to grasp the idea of sport literacy, such as, "What are some examples of knowledge that help you get interested or increase your enjoyment?," "What are some examples of knowledge that you might think are important in fully understanding the game?," "What are some examples of plays or scenes that interests you?," and "What are some examples of knowledge that you will tell a person who is watching a sport game for the first time?" In addition to investing the components of college basketball literacy, the participants were asked about the benefits of being literate in college basketball as well as how they develop their knowledge through their life course (see Appendix A).

To explore additional knowledge components and examples, 'scenario plays' were conducted in order to observe the experts' delivering their knowledge and fundamentals to the novices. Twelve experts were asked to explain the game as they were shown a 20~25-minute clip of a college basketball game. In total, four different clips were used, each one starting from the beginning of the game and also including some highlight scenes or plays. The experts were told to watch the game as if they were watching with someone who has never seen college basketball before. Their comments and responses were audio-recorded with some note taking, and after the completion of the clip, the interviewer revisited some questions asked previously in the semi-structured interviews to gain some feedback. The selected titles of four video clips were:

Video clip 1: 2008 NCAA Basketball National Championship Final

Video clip 2: 2008 NCAA Basketball National Championship Semi-Final

Video clip 3: 2009 NCAA Basketball National Championship Final

Video clip 4: 2011 NCAA Basketball National Championship Final

This study employed an additional investigator other than the principal researcher. Charmaz (2006) noted that a multiple investigator approach enhances the creative potential of research that brings complementary insights aiding the richness of the data. Also, this approach improves the reliability of conflicting findings. Data collection procedure for each participant continued until the themes or categories were saturated. The study was conducted in the southwest region areas of Austin, Texas. In addition to the snowball sampling method, participants were recruited through a university's website, sport community outlets, etc. The researcher used university networks such as sport management department, UT athletics to contact participants who were involved with college basketball. All participants voluntarily participated and revisited when new findings or ideas come up during follow-up interviews with other interviewees. The researcher set a pilot study with sport management faculty members before proceeding with real interviews to accurately design the interview plan and procedures. The findings were also revisited by interviewees as well as by another pool of content experts to establish the content validity.

Entering the Field

The nature of theory building from case studies lies in the comparisons among cases. The frequent overlap of data analysis with data collection enables adjustment to probe emerging themes and categories. Data collection began by interviewing twelve individuals from southwestern area of the US. Interviews began on October 15, 2015, and ended on January 22, 2016, until the data saturation for the interviews had been reached. All interviews were audio recorded and transcribed. The interviews typically lasted from 45 to 60 minutes. The study also incorporated field notes, written comments during and after interviews. This process helped analyze cross comparisons within the collected

interview data. The interview data, memos, observed data from scenario play, and narratives of video clips were integrated into the NVivo qualitative analysis software. This process increased the reliability of the study as well as allowed consistent investigation when there were emerging themes or categories of findings during the collection procedure.

Analyzing Data

Analyzing data is frequently referenced as 'the heart of building theory'. It is a complicated process due to the volume and variability of data where it requires a systematic approach to drawing relevant findings. This step has a two procedures: 1) within-case analysis, which allows the researcher to be familiar with interviewed data resulting preliminary theory generation, and 2) cross-case pattern search that seeks for intergroup similarities and differences from observed data through multiple lenses. Within-case analysis began with memo writing along with the interview data. From each interview, the interviewer wrote extensive memos to analyze the collected data connecting concepts and developing categories. The memos were used as benchmarks that allowed the researcher to effectively and conveniently find relevant data from the coded transcriptions. This write-up process often composes of thorough descriptions but is central to finding conceptual frames within given questions (Charmaz, 2006). It also allows for the basis of comparisons for each case in drawing common properties, categories, and elaborated themes in order to create and direct the questions in the next interviews. The study employed a series of coding techniques used in the grounded theory to analyze the transcribed data (Saldana, 2009). The initial coding process was conducted by a line-by-line, allowing the researcher to find all possible theoretical elements, concepts, and categories from the data. In this stage, a variety of terms and

phrases emerged, such as “coach,” “pick and roll,” “fast break,” “what’s going on,” and “reading the play.” Following the initial coding step, the domain and taxonomic coding approach was also employed to capture as the sense of overall themes or categories from the data. The similar and recurring codes or concepts were grouped to investigate the larger categories, such as “rules”, “skills and drills”, “player/team/coach history in story”, and “player/team/coach statistics”. Next, a continuation of this process within and across the cases was to find theoretical properties of the category, refining the concepts that capture the overarching category (Figure 3). This allows for the identification of relationships between categories and subcategories of concepts with their properties and dimensions. This study analyzed the similarities and differences between the cases using the NVivo software, which enhances a more sophisticated understanding of cross-case searching processes that leads to a more accurate and reliable framework.

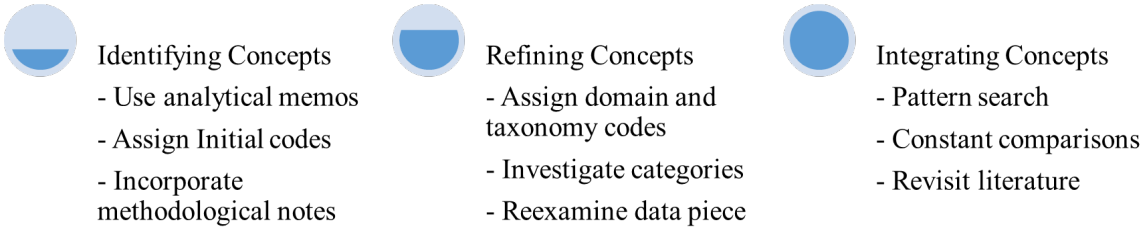

Figure 3. Data analysis protocol

Shaping Hypotheses

Through the highly iterative process, the study suggested a tentative framework for sport literacy (i.e., college basketball literacy). ‘Shaping hypotheses’ highlights the shaping of constructs that involves “(1) refining the definition of the construct, and (2) building evidence which measures the construct in each case” (Eisenhardt, 1998, p. 541). Miles and Huberman (1984) suggested a usefulness of using a table to represent

summarized concepts and tentative construct driven by data analysis. The emerging themes from this study were reframed with the scientific literacy framework (content, context, and competency). From the analysis, the study suggested that there are differing levels of sport literacy where sport literacy is dynamics of comprehension, application, analysis, and synthesis/evaluation founded in content and context knowledge. The revised constructs were revisited with the combination of data sources (e.g., memos, observations) to permit the validity of the constructs.

Enfolding Literature

This step aims to strengthen the findings/framework by integrating relevant literature in a table. The study continuously discussed both supportive and conflicting literature to find the gaps and potential development of the framework. The goal of this step is to establish stronger internal validity, wider generalizability, and a theoretical level of study. In comparison to the scientific literacy literature, the study came up with six learning progression (knowledge, comprehension, application, analysis synthesis, and evaluation) across upper and lower categories of college basketball such as 'content knowledge', 'context knowledge' including the concept of prediction, reading plays, and management.

Researching Closure

'Researching closure' indicates the theoretical saturation that requires researchers to know when to stop adding cases and iterating analysis from given data. Theoretical saturation is considered when additional incremental information for data analysis is minimal. Given intensive immersion from the researcher, multiple case study method with twelve content experts participated, allowing for the research study to reach its

theoretical saturation. Additionally, this framework was double checked with the informants regarding phrases and interpretation of the developed constructs.

RESULTS

This study explores the case for sport literacy, specifically in watching men's college basketball. It summarizes why sport literacy matters, what are the components for being literate in watching sport, and how can this literacy be developed through interviews of college basketball experts, noting that sport literacy is both the foundation in appreciating sports and facilitating the sport experience. The study then investigates additional knowledge components that require spectating through a 'scenario play' that shows what the experts would like to encourage spectators to watch. Since sport literacy components can also be found in broadcasting, as it is not only a source of learning as well as development, the study examined the narratives from commentators of college basketball games for exploring the array of sport literacy.

From the interviews the term basketball literacy means having enough knowledge about basketball to enjoy watching the game, as well as, to communicate and teach others who have little to no knowledge of a certain sport. Participants believe that in order to have more people watch basketball, there must be a way to impart the knowledge of the game to those who have less literacy, specifically those who have no knowledge of the game. John described his opinions about this study after an interview as below:

> What Mr. Kim is trying to do could be compared to describing honey to a person who has never tasted honey in a way that will create a desire for honey. Once the desire is created then he or she will never stop eating it. Mr. Kim would like to create a something that can be given to the basketball illiterate that will give them enough knowledge to appreciate and enjoy watching thereby turning them into fans and causing basketball to grow.

John's comments emphasize the level of difficulty that the study is trying to undertake, while also praising for its potential in the future. He implies that through this study, the number of possibilities for people to become literate exponentially grows.

Importance of Sport Literacy

The rationale for having spectators become literate underlies the theory of learning. As noted in chapter 1, learning outcomes are usually expressed in knowledge, skills, and ability to perform within an educational context where these outcomes are related to factors such as self-esteem, creativity, and attitude. Grounded in this assumption, the study explored RQ 1 how sport literacy could affect spectators' experience when watching college basketball games. From the experts' experiences, the study revealed the role that sport literacy plays, which may create opportunities for spectators in enhancing their sport experience (increase enjoyment, engagement, appreciation, fun, etc.), and aiding in their communication with others.

Enhancing Sport Experience

Participants identified that sport literacy is a key component for increasing their spectating experience. Although some participants mentioned that people do not necessarily have to be literate in basketball, being knowledgeable clearly helps to enhance their experience. Eight participants asserted that knowledge helps the appreciation of the game, and all participants described that knowing on and off the court knowledge about the game creates fun and excitement. Listed are the representative quotes from the participants.

> *(Appreciation)* I guess it kind of goes back to the appreciation of the game, the more knowledgeable that you are the more that you can appreciate the game and I just think that the value of watching a game, a college basketball game on TV and knowing the history, knowing you know why they're playing, you know, people talk about knowing your why, um, knowing why these guys are going so hard and

> what they are representing, they're representing something greater than themselves um when they play, that's, I guess that would be the biggest value to me if I'm an average fan, is increasing that knowledge so that you can really appreciate the product that's put out on the floor, um it's entertainment value. (Chris)

Increased knowledge allows a spectator to connect to certain factors and aspects of the game, such as rules, players, traditions, etc., and over time form a personal connection. This places an increased value on spectating the game, and an overall sense of appreciation.

> *(Engagement)* Because if you know more about basketball I think you'll appreciate it more. And if you don't then that means you probably just really don't like basketball very much, and that is fine. But when somebody learns more about football and they get very excited about football that means they really like football. And so for me every time every day I learn a little more about basketball and that makes me want to watch basketball more and more. I think that learning more and more makes you want to watch it more and more. (David)

Increased knowledge leads to interests and vice versa. This cycle creates continuous engagement from the spectator, whether it is from reading articles about the sport to attending an event. One participant discussed how being knowledgeable increases interest in the following way:

> ...you know it does by being sort of like knowledgeable and literate with basketball, it does. You know it's entertaining to watch when you really know it, so it does give a benefit as far as the entertainment side of your life. Cause I like to work out, you know physical fitness, I like to read, but I also like to watch basketball adds you know, how do you say, adds enjoyment happiness to your life. You know entertainment yeah (John)

Being knowledgeable does not end with just obtaining information about a certain sport, like learning math from a textbook, but through steady appreciation and enjoyment it becomes part of a lifestyle and a source of entertainment.

In addition to the outcomes of sport literacy, participants clearly demonstrated the difference of being literate by comparing novices and experts.

> Well the less knowledgeable people ask questions throughout the game like my girlfriend. And then repeatedly ask the same question that's already been explained and start talking during the important parts. (Andrew)

Novices have a tendency to ask repetitive questions and interrupt during crucial moments of the game. Repetitive explanation in varying ways is needed in order to increase their literacy level.

> The differences that I think are, the biggest one that I think is enjoyment. I think that people that don't, like research basketball like I do or aren't knowledgeable about it, I just don't think that they enjoy it as much. And I like to take people to games with me cause I like to go to basketball games, I go to Texas games every now and then and stuff, and I like to take friends with me and it's not fun when I'm knowledgeable and they're not about it. They don't, they just sit on their phone or whatever, or do something else, and I like really get into the game so I'm sitting on the edge of my seat. So I think that enjoyment of it is the biggest difference in it. So people that don't like it tend to not care as much and they're not knowledgeable about it. So, yeah, difference, probably, that's the difference. (Steven)

The level of enjoyment felt by novices and experts differed drastically. Where the experts on average experience high level of enjoyment of spectating the game, while novices are less interested and are easily distracted or bored. Increased knowledge could lead to increased enjoyment as novices learn what to watch for when spectating a game.

> I'll say that the biggest difference is that they're not comprehending or understanding what's going on in the game and I am. They're seeing it but it's not registering in their head. Whatever is happening is not, I mean they're not processing, they're not getting why some things are happening the way they are when I know that this is what should happen and they're doing the right thing, so you know I just think it's the basic concept of knowing of what is going. (Kirk)

The depth in the level of analysis of the game differs between experts and novices. Experts are able to comprehend the complexities of certain plays and rules, while novices would only see the surface value of that specific play or rule. An engagement of utilizing one's mind and processing the information given to them when

spectating could lead novices to understand these complexities and analyzing them appropriately.

The Components of Sport Literacy

The results for RQ2 finding literacy components were achieved through the analyses of experts' interview data including memos and coding. The literacy components were also probed through additional methods of scenario plays and content analysis, which were appropriate for conducting a detailed index of major categories in the data. The lists of categories were classified and grouped together under hierarchical taxonomy based on the shared attributes. Throughout the process, analytic terms were developed, further aiding the discovery of components and domains for developing a conceptual framework. Ultimately, the analyses from multiple cases led to two major categories with seven subcategories. The results revealed that sport literacy involves the understanding of what's going on in the game, HANDS-ON KNOWLEDGE, as well as the CONTEXT KNOWLEDGE which enhances the sporting experience. Subcategories for hands on knowledge were rules, skills and drills, strategy, and terminology while subcategories for context knowledge were history and culture, statistics, and organizational structure (Table 3). These subcategories are types of major categories, which are discussed and described in this section.

Table 3. Taxonomy of college basketball knowledge

Upper Category	Lower Category	Elements/concepts
Hands-on Knowledge	Rules	Scoring, time (3 seconds, 5 seconds, 30 seconds), timeout, fouls, violations, etc.
	Skills and Drills	Offensive skills and drills (ball handling, shooting, passing), defensive skills and drills (aggressiveness, positioning, taking Charges), screening, rebounding, athleticism, awareness, timing, energy/emotion, etc.
	Strategy	Offensive strategies (pick and roll/pop, cutting, off-ball screens, isolation, post up/Shooting centric, fast break/grind out, going "big" vs "small"), defensive strategies (man to man, zone, press/trap, blitz/Ice, switching/no switching, aggressive/opportunistic)
	Terminology	Air ball, assist, blocking, dunk, fade away, fast break, flopping, layup, pick and roll, back screen, three- -point play, etc.
Context Knowledge	History and Culture	Rivalry, championships, success/failures, figures, styles, sub-culture (team name, color, traditions, rituals), recruiting, scandal/controversy, injury, etc.
	Statistics	Player/team records, free/shooting throw percentage,
	Organizational Structure	March Madness, matching structure, schedule, etc.

Hands-on Knowledge

The domain of HANDS-ON KNOWLEDGE included the following categorizations: (a) RULES, (b) SKILLS AND DRILLS, (c) STRATEGY, and (d) TERMINOLOGY. Each subcategory is grounded in the interviewed data, supported with quotes. This theme was emerged inductively from subcategories explaining the content of game knowledge and actual playing components.

Rules

Guidelines for players, coaches, fans, and other staff members which have been laid out in order to keep order in the game as well as to enhance the product of basketball.

Rules vary from gameplay (fouls, travelling) to coach's etiquette (standing zones, timeouts). Rules are necessary for the viability of the sport's product, league parity, and also catering to an ever-evolving climate. The function of these rules gives players a structure so that the game has a well-defined organization that leaves no room for confusion among players, executives, fans, and the consumer at large. Without these rules, or without a proper organization of the rules, college basketball could not survive. Rules are the foundation of any organization and college basketball is no exception. Once this foundation begins to become inconsistent, the rest of the construct inevitably fails. The acquisition of these rules is primarily based on the amount of exposure a coach, player, and fan has to them. If someone is exposed to significant amounts of studying, application, and watching them unfold in game settings, the acquisition becomes exponentially imparted on the individual.

All twelve informants stated that understanding the rules plays a critical role in the appreciation of the game and identified it as a fundamental knowledge that spectators should be equipped with when entering the game. Participants talked about how rules may affect spectators' understanding particularly for novices, leading to an increase in their attention level and interests, which are discussed in the later chapters.

> So you want to start with that cause that's probably the most basic component for a spectator, not necessarily for a player. And then you want to, I guess you can probably start focusing on just generic rules, traveling, if the ball goes out of bounds and fouls, because there's going to be a lot of those in most games, so you want to understand that whenever they shoot the ball and it doesn't go in they get two shots or 3 shots depending where they are on the court, or if they are doing layup and get fouled or having a jump shot and gets fouled it's going to be one shot if it goes in. So, I'll say the general rules you want to focus on and the fouls that are going to be called during the game or how you want to approach somebody who just learning. (Alex)

Knowing the point system of basketball is a foundational aspect of understanding the game. From jump shots, lay ups, to fouls, knowing the points that are allowed or possible for each play is crucial.

> She mainly asked me questions when the referee blows the whistle. You know, like, someone would foul and the referee blows the whistle and she's like what happened? You know, and so I have to explain you can't hit someone on the arm or physical contact in certain points of the game are illegal so, you know, and then they shoot a free throw and I have to explain the free throw, you know…all I could really do is explain to her, whenever she had a question, you know. Why did this happen, um for example, I remember one time, one team has 6 players on the court, you know? Because it was a free throw situation and the coach had subbed someone in and the person who subbed in didn't tell the person he was supposed to sub out to come out the game and so the referee blew the whistle and my wife is like what happened. I was like you can only have 5 people from one team on the court at one time, you know, it's supposed to be always 10 people on the court. (John)

Knowing the moment when the referee blows his whistle is another important part for spectators to understand the game situation. Also, knowing basic rules of why the referee blows his whistle (e.g., fouls, illegal substitution, illegal play) is a necessity when watching basketball.

> I'll have to say the rules. I think the rules, the basics of the game, so you know when something is called or what happened. You don't have to ask the guy on your left what does that mean? Um, you know when a team goes into the bonus, it's a one and one or two shots depending on how many fouls. I think you know it's important, because someone that doesn't know they're going to see a foul without a shot and they're going to ask oh why is he going to the line? Um, so I think the rules I would say as the base and then I would say to pick a team for a season and just watch them. (Kirk)

Knowing the basic rules is beneficial when watching a game with others, and it'll clear up any questions that you may have yourself during the game. A good strategy to implement would be to choose a single team and follow them through a season and learn as you watch.

> Yeah to someone that just started watching, first I think is essentially the rule. I mean I think that's where you start, or how you score in the points, and fouls, and basic strategy for what they do. I mean I'll talk about basically the rules, if someone is in foul trouble, and if someone comes out and why they're coming out in the game or why they're being substituted, I think why they're being substituted. What the score is um, basic, just basic things, cause to someone that doesn't have history or doesn't have, they're just trying to understand you know this is a 2-point shot that's a 3-point shot, this is a foul, this is a, simple things. (Peter)

For novices, simple and basic rules will help them a lot in understanding the game and what's going on. Then they can slowly learn more about the game and further enjoy the game.

In addition to the basic rules, informants pointed out that rule changes in college basketball are fascinating point that needs to be considered. Because the NCAA college basketball rules change almost every year, sometimes they are not as big but do capture the informants' interest, which creates new situations for game scenes and unconventionalities with plays.

> This year, 5 seconds off the shot clock, that's a big deal, to the average fan they might think that oh it's just 5 seconds, but that means many many more possessions per game, that means a faster tempo, that means you got to get the ball, you got to get into your offense a little bit quicker, um, it puts a lot more pressure on the defense because they are coming at you faster, and so I guess knowing that, keeping up with the rules has been a big deal, um for not just me for I'm sure thousands of coaches all over the country no matter what level you play at. So I guess that would be the number one thing for me. (Chris)

Five seconds being shaved off the shot clock significantly changes the entire aspect of the game. A faster tempo, more possessions per play, and new strategies are all examples of products that came out from this rule change. This does not just affect the players, but coaches and spectators around the world.

> For example, you know inside the lane on offense, once you enter the lane you can only stay there for 3 seconds. So that's why like you see so much movement, normally in offense you see movement in and out of lane, you see the big guys

> kind of posting for 3 seconds jumping out of lanes. And so knowing that you can only be in a lane for 3 seconds it kind of makes it interesting too. Also, I thought about shot clocks. For example, in NCAA they just changed it from 35 seconds to 30 seconds and so, it used to be 45 seconds you know, so. (John)

Only being allowed to stay in a single lane for three seconds at a time causes players to move around more and produce a higher tempo game. You see certain positions playing certain ways due to this rule, leading to the creation of strategies and plays.

> And the rules change, I mean over time, even this year there's rule changes. Because, the rules have changed, the strategy and how teams played changed. You know I think you look at it differently whether you are a fan or if you just like the competition aspect of it…They called it the four-corner offense, so basically they would get the lead, they had the better players because they were always the top 5 or top 10 team and then they will pass the ball around the four corners of offense and just waste the clock and so the other team had to either foul them and they were good free throw shooters or the clock just ran out and they lost. And so they put shot clocks in you know because typically rules get put in place because somebody abused, so they created the 4 corner offense which they used for years to their advantage until the rules changed to kind of make it a little bit more fair, and so you know for me part of, you have the history for what's happened and how the rules have changed and how the game is played differently and how the players are different you know different. (Peter)

The continuous change in rules through the history of basketball is largely due to previous abuses of a pre-established system. An example would be the four-corner offense, where a team with an early lead will definitely win the game if they just pass the ball around until time runs out. Rules are changed to balance the game and to make it more interesting for the spectators to see. This also shows the significance of spectators and their role in changing and strengthening a sport.

The informants asserted that it is not necessary for spectators to be highly confident about knowing the rules in order to enjoy spectating but they also stressed that understanding the rules enables them to fully appreciate the game and advances their spectating experience and important components that people should learn about the game.

Skills and drills

Skills and drills allow a player to take his game to an elite level of current collegiate athletes. The meaning of these drills can vary in how players want to use them but in order for a player to reach the potential they can, these drills means taking their natural abilities (both physical and neuromuscular) and sharpening them with repetition of drills. For example, even if a young player has a naturally gifted physique and high neuromuscular ability, that doesn't necessarily translate to a skilled ball-handler, even if it may help. Combining the natural physical and neuromuscular abilities with hundreds, or thousands, of two-ball dribbling repetitions can take that player to levels that his natural ability simply cannot. The function of these drills is to sharpen the player's ability in specific areas of basketball. If a player is a terrific ball-handler but a below-average shooter then the player has to spend hours shooting thousands of game-speed shots in order to improve that aspect, regardless of how good of a ball-handler he may be. One skill can help another, like ball-handling can help passing, but all basketball skills are not translatable insofar that a player can only focus on couple aspects to be an elite player. That leads to a one, or two-dimensional player, which has a limited potential for improvement.

This category is related to the athlete's physical movement shown in the game play. All experts highlighted this category as another important domain that spectators should understand. Because players' skills and drills does not only serve as key for tracking the ball movement and plays but also drives aesthetic moments for the spectators. It is expected that all experts have different interests depending on where they are coming from and other varying factors. Some have greater focus on watching the plays on an individual level and others have interest in analyzing the game on a team level. However, interview data revealed that all informants were fairly confident in

evaluating the plays and performance among the players, which in this case knowing both the good and bad and having too much knowledge and literacy could have affected or skewed their viewpoints and perspectives on basketball when being interviewed.

> I remember I saw that one player where he dribbled between his legs and he kind of lost it but then this other guy tries to come and steal it and mid dribble he sees him and sees that the guy on the left, he just chunked it, he passed it to him, cause he knew as soon as he saw this guy at his corners eye, that guy's wide open, so he threw it and I was watching it, it might have been my girlfriend or something and I was just like, holy crap that was amazing and she was just like what, he just passed it. No, he just not just passes it. (Steve)

The exact level of difficulty or significance of certain plays is hard to comprehend, but if understood, it serves as a source of amazement and appreciation. Experiencing watching someone conduct an extremely difficult play is part of being literate and reason to spectate a game.

> Well, yeah, I was like watching like the big dunks that you see, I remember like when Blake Griffin was playing for Oklahoma, we were watching him play and actually humiliating people. Like he hit his head on the backboard while he was going up to dunk it. That was crazy, being like the big plays and seeing all the fans go crazy and they were heckling the players about it, which really fun environment… Yeah, some triple screens and throwing up the, hitting the 3 and throwing up the land shark. He would, stadium rocking when he playing. He was really fun to watch, did a lot of captive, but you know. (Bryan)

Watching a single specific individual, like Blake Griffin, who is completely different from everyone else, can be refreshing and enjoyment to watch. Seeing individuals like him doing feats that are near impossible for others with relative ease is something that only literate people can understand and appreciate, since they know the significance of their plays and actions.

> When I do watch basketball it's usually a team that I like that I, like there are players on the team that I like and I like the way that they play together and so I focus on, on offense I focus on how well they move the ball around, how well the players' kind of move without the ball, um also you know just focus on three-

> point shooting, you know, dunking, you know. Also, the plays that lead up to these, you know to the dunk and 3 points. (John)

Literate people may choose to watch certain teams or players due to their playing style. The way they play together, chemistry, is something that can be understood and analyzed by literate people. Liking a certain offensive style of play is always in relation to all the other styles of plays that are out there, and it's a reason why some people watch basketball.

> I would say, don't think so much about whether the ball goes in the basket or not. Just like in soccer, it's not only about the ball going in the net. It's about the situation, the play, how did it happen. I mean, if you a watch the game just about the ball went in or not. A player can do something amazing. Make a great pass, but his teammate misses the shot. You can look at that and say doesn't matter, who cares, he missed the shot, on to the next one. When in reality you should say who is that guy that made the amazing move and made the great pass, which maybe another player would have made the shot. And then you would have said well look at that amazing pass. The pass was still amazing, the guys just didn't make it. So, it's important to watch it for what it is worth and to actually analyze exactly what's going on. Instead of just thinking oh they made it good, oh they missed it bad. It's not just black and white. (David)

Just anticipating for the ball going into the basket is not what basketball is about. To truly understand and enjoy spectating basketball, one would need to know everything that leads up to the moment that the ball goes into the basket or not. Great plays can be made ending with a missed shot, so it is important to appreciate those kinds of plays, individual talent, and group effort.

> I loved watching Jahlil Okafor. He was just so fun to watch, you can give it to him down low, he can easily score, the giant mitts of hands that he had. He was a dominant passer, so I feel like watching a game with that one guy just down low that gets the ball every time, it's just really enjoyable. (Steven)

Interestingly, the study found that watching skills and drills can be an impetus for playing basketball. The influences of spectating at times encourage people to go out of their way to actually learn how to play basketball and play it themselves. Predictively,

depends on the level the spectator plays, understanding this category would positively lead to actual practice or plays for people who have the chance to partake in playing basketball.

> And so White Chocolate went to go play for Sacramento and Vancouver and all that. Anyways, if you see a player like him. Passing the ball like that. I love passing, because one of my favorite players when I was kid was Magic Johnson, and, so seeing him play call college basketball. Or seeing somebody like John Wall. John Wall at Kentucky was so fast and he was so amazing and did things I could never even dream of doing. Doing, those things makes you want to go do them. So if you see John Wall making an amazing pass or Jason Williams do something crazy, well the next time you go play you're going to do something like that. So the way that you play influences the players and teams that you like and vice versa. (David)

The inspirational plays or moments that iconic figures deliver during a game, not only impress those who are watching, but transcends it and influences them to go out and try to emulate the same exact kind of play.

> Like, step back shots like James Harden or anybody really, just see somebody light it up like score 30 or 40, like something crazy like that, and dunks and blocks always get me hyped up. And then I really like to watch guards play just cause I am one. Just try to, sometimes try to do what they do, where you know, oh look at that, maybe I should try that when I play with something like that. (Steve)

For players, having a role model, or seeing someone who plays the same position as oneself play incredibly well is enough motivation to ignite a strong desire to practice, play, and continue watching basketball.

Strategy

Basketball strategies take many different forms. There's coaching strategies, which includes offensive and defensive sets (HORNS, 4-out, isolation, spread pick-and-roll, pressing, zone, box-and-1, switching pick-and-rolls, etc.), lineup rotations, time distribution, sideline out-of-bounds (SLOB's), baseline out-of-bounds (BLOB's), psychological strategies targeted to both opponents and their own players, motivational

strategies, opponent game plans, and more. Player strategies can include offensive and defensive mentality or playing style, aggressiveness, opportunistic, verticality, trash talking, and more. All of these aforementioned strategies are functions that coaches and/or players try to gain an advantage against their opponents to try and help their own team win. There are some strategies that work with exceeding effectiveness with some teams and work at disastrous proportions with other teams, even if it's the exact same strategy. These strategies can be more or less important depending on who's the coach and team that is implementing them because the reality is that all of these strategies can work well or horribly, depending on the contextual environment to which they are applied. The acquisition of these strategies is based on how much studying and application a coach, player, or fan does. With more studying, application, and a heightened intuition on how and when to apply these strategies, the effectiveness, and knowledge, increases.

Participants identified a need to know about basketball strategies as part of appreciating the game. Particularly, all participants mentioned that college basketball highly implements their team strategies within the game than any other level of basketball games where understanding this component drives excitements and tend to focus on the execution of the game.

> Kansas, when you bring it inside they tend to double team the guy with ball so that creates an opportunity to kick it back out like they just did to get an open shot. And so that guy who shot, they said they'll give him that shot because he's not a good shooter, so if you have a big guy that's shooting from the outside and has a low percentage you kind of want, you want him to take that shot. He would have been better off dribbling it and finding someone else to pass to than taking that shot because really it's a turnover if you take a bad shot and the other team gets a rebound. (Peter)

> Um, so, the two, there's probably two that I enjoy the most. The first one would be like you said the coaching strategies, um, in my view college players are sort

> of more like emotional, more intense about it, and to see a coach direct that energy, or even just draw like a badass play or something and like watch them execute it, kind of like execute the vision is like really interesting to me, exciting. And uh the second aspect that kind of draws me to it a lot is to see like those emotional guys or whatever, guys who are super into it, like trying really hard to win, like working together. Just to see them digging deep to win particularly (Andrew)

> So maybe switch to zone or switch to a man, cause they play a man defense right now is when, man defense is when you stay on a man and follow that man and not yet him get up… normally a lot of players towards the end of the game when they're down by little points intentionally fouls sort of bad free throw shooters to get an opportunity to miss both and for the other team to get the rebound and they'll get a score. (Steven)

Knowing the tendencies and statistics of each player is crucial in strategizing against an opponent. Allowing a bad shooter take a shot is far more efficient than letting him pass the ball to a different teammate. These kinds of information are the basis of certain plays and strategies that college basketball teams implement, and a reason why it's fun to spectate. Strategies are classified as offensive strategy and defensive strategy in a broad sense and it also categorized within individual level plays (e.g., pick and roll, isolation) as well as team level (e.g., set offense/defense, press/trap).

Terminology

Participants identified terminology as another key component for sport literacy. The form of language that is used in college basketball allows spectators to recognize the motions or plays executed by the players. The terminology serves as a basis for sharing undertaken rules of basketball and leads to an appropriate understanding and communication. It appears within both hands on knowledge and contextual knowledge but mostly used in basketball settings that are categorized under the theme of hands on knowledge. Examples of terminology, which were highlighted in the study 2 and 3, are shown in the Table 3.

Context Knowledge

The domain of CONTEXT KNOWLEDGE that emerged from the data supports this study's assumption of background knowledge or contextual knowledge enhancing spectating experiences. Participants identified three subcategories that arouse one's excitement: HISTORY AND CULTURE, STATISTICS, and ORGANIZATIONAL STRUCTURE. Each subcategory can be obtained from reading, research, and broadcasting, which are useful sources for managers to develop strategies for creating fans. What is most notable in the responses of participants is how they enjoy research for this context knowledge in their spectating experiences. This could be positive and help spectators get into college basketball and retain their level of interest.

History and culture

Player, coach, and team history is an integral part of context knowledge because of the foundation it lays for both the participant and the spectator. Without knowing about the players and coaches involved, the literacy that a spectator can achieve is limited. Each player, coach, and team has its identities, styles, and personalities both on and off the court. Without this background knowledge, it's difficult to develop true literacy. Additionally, team history plays a vital role in how the game will be played. For example, knowing that Duke and North Carolina are fierce rivals allows you to watch a game in a different frame of mind than if you thought that game was just like any other college basketball game. Acquisition of this knowledge is predicated around years of exposure and active studying about the history of collegiate basketball.

All participants identified history and culture as a subcategory of context knowledge which is enhancing the experience beyond the game itself. Specifically, history and/or story of team/player/coach (12 references), rivalry (8 references), and sub-culture (6 references) were found as components across the participants.

> I know that Damien Miller came from nothing and I read that as well, he grew up really poor and had like a rough childhood, I can't remember it all, but I remember he, he went through a lot when he was younger. And he's always been like kind of like an underdog. He went to like a small college, but now he's one of the best point guards in the NBA, so I really like watching him, that helps my enjoyment. (Steve)

> And the, this might not be true but it seems like when I've been to college games, the people that attend the games have some affiliation with the university, tend to be higher educated versus go to a professional, cause I've been to a lot of like a Tampa Bay Buccaneer NFL games and NBA games and it seems like they're more blue collar. Okay, so it seems like the fans, in general seem, higher socio-economically and also more interested and you have a lot of college students that are part of it that are very enthusiastic and do crazy, like Colorado, there's a lot of guys who get dressed up in costumes and it's uh, it's just fun, really into it, whereas in the NFL, you don't have that. (Peter)

> I think also, college basketball is a lot more interesting than the NBA when you know the history behind college basketball, because you have certain teams who have been like great teams over a long period of time. So, there's a lot of history behind college basketball, whereas NBA is more professional and the players are not as, how would you say it, um, committed. It's a different commitment when you're playing college ball, basketball and when you're playing NBA. NBA they pay professional and college is because you really love it and you want to get to NBA. So, it's just, it's just a different energy level with college basketball. (John)

> You know from North Carolina to Duke, which is arguably the best rivalry of all of sports, you know kids camp out nights in advance trying to get tickets to those games. Um, I think the enjoyment of beating that other team whether or not if you go to that school or not, if you're a Duke fan as I was growing up, I didn't want to lose to North Carolina when Duke played them. And I have no affiliation with Duke whatsoever except for the fact that I love watching them play and I love watching them beat North Carolina, but that definitely increases the enjoyment, rivalries would be a big enjoyment of college basketball. (Chris)

Knowing the history or culture behind certain players, teams, or schools is significant for understanding the importance of certain games or players, and places a higher stake in them, which leads to a high pressure, intense, exciting spectating experience for those who are involved or affiliated. Examples for the history and culture

category include team/coach/player knowledge as well as the sub-culture of the team and rivalry.

Statistics

Player, coach, and team statistics are available in order to properly put current situations into context. Without that, the basis for the study is rendered moot because of how important the context is to sport conversations. Statistics are used to form arguments, opinions, and predictions as to what can happen in a given situation. Without a basis in statistical knowledge, it becomes increasingly difficult, and probably impossible, that someone can truly gain a true literacy. For example, if Team X has the highest points scored per game in college basketball (CBB) but Team Y has the highest points allowed per game in CBB, one could surmise that Team X has a favorable advantage. These statistics form a significant part of our ability to analyze basketball and without acquiring this knowledge through years of study or enough exposure that the basics are learned by osmosis, it's likely that literacy will not reach its necessary potential of nuanced discussion.

> Another thing that's really interesting to me is the statistics of the game, which isn't necessarily a play that happens during the game but nowadays coaches are handed stats almost every time out. um, you know, they're given full stats for both teams, each immediate time out you know what your field goal percentage is, you know how many rebounds, how many turn overs your team has, those can lead to direct results, you know, wins and losses, and not only the end game statistics, but the post-game really really super detailed, the synergy nowadays is that you can go really detailed into hotspots, where people are shooting well from, where they are not, that really interests me right now. (Chris)

> I would tell him like the background of the game. Watching Duke UNC for the first time, then I'll probably point out different players and tell him like stats so that he could, that's probably one of the most enjoyable things for me is just watching all these great players playing (Bryan)

> I always go on ESPN to check the scores for, you know, college basketball games. I always go on NBA.com to check the scores of the basketball game. And I do that every day. (Mike)

> 71 percent is average and at the end of the game it maybe, you know, it's best for them to be shooting free throws. It's just in college basketball you got players that could shoot 40, 59 percent and you get some that could shoot 80, 90 percent. It's a huge variation and that could lend yourself to a strategy because sometimes if there's a really bad free throw shooter then you can just foul the bad free throw shooter. (Peter)

As was mentioned earlier, knowing the statistics has become a crucial aspect of the game for coaches, players, and spectators alike. It is because of statistics that certain plays of strategies are done. The reasoning for the majority of the plays can be boiled down to statistics, so knowing statistics of certain players or teams can inform a spectator on what to watch for and to understand why certain plays are being conducted.

Organizational structure

College basketball (CBB) has a plethora of events with varying structures, formats, and venues. As a running example, the NCAA Tournament, or March Madness, as it is affectionately called, is a 68-team bracket style tournament in which the 68 qualified teams are seeded 1 through 16 with 4 teams in each number denomination. Theoretically, the best 4 teams in CBB will have the 1-seed denomination, the next 4 will have the 2-seed, and so forth. Each stage of the tournament has different venues, regions, and implications that are key to the specific game that is being played. For example, the implications and situations that surround the #1 seed University of Oklahoma (OU) playing in Oklahoma City is vastly different than the #11 seed University of Southern California (USC) playing in New York City. These distinctions, which can only be learned from active exposure to CBB material, separate a surface-level knowledge of college basketball from the nuanced literacy that allows for more apposite discussions.

> And then, for me, March, I love the tournaments, so they know winner go on, so there's intense games that comes down to the last second, those are just, they're exciting to watch. (Alex)

> There is nothing more enjoyable than watching March madness. And I say that as a whole event, but the first round games are, I mean I can't miss it, it's a must watch TV for me. I usually got 4 TVs or 4 tablets whatever set up to watch simultaneous games, like I mentioned earlier, all the preparation that goes in into those games, the upset, everyone loves them an upset. And um, that's so enjoyable to watch, um, just knowing the work that went into that game, and um, March madness is such an event, you know you go in, I filled out brackets for years since I was little and seeing your team win when you picked that upset there's not much more enjoyable than that. (Chris)

> I have to say why I mean, the times that I watch it most and I get really interested is March madness when you know, March madness is kind of, you kind of watch these teams throughout the season, I love seeing upsets in college basketball on any level I love upsets, but college basketball is probably the biggest platform for upsets to happen and um I just love seeing the underdogs beat the top guys and these storied programs, you know Duke losing 2 straight to Notre Dame. I'll say that it's the March Madness and just kind of the upsets that happen in college basketball throughout the year. (Kirk)

With regard to college basketball, March Madness seems to be a key event that encompasses everything that a spectator could expect out of college basketball. Factors that garners show much attention from the spectators would be favorite teams winning (affiliation included), upsets, spectacular play, and games that go down to the last second. An environment where it's hard to easily predict who will win is something that excites those who are watching and creates an air of constant "on-edge" feelings that could translate to curiosity, which then could translate to watching the game in order to know the outcome.

Development of Sport Literacy

The current study also explores the meaning of being literate in sport and how we develop sport literacy (RQ 3). From the interviews, we identified that sport literacy can be understood as 'a process of learning'. And this particular process creates interests as

spectator literacy increases. The mechanism of developing literacy relies on both knowledge and interest where the creation of interest varies not only from hands-on knowledge but also from context knowledge that creates a better understanding what is going on behind the scene. Moreover, sport literacy could be developed through the understanding of knowledge, which leads to further focus and engagement with the game.

> Well, I think you can compare it to school really, I mean you go to class and you have to be engaged to understand the material. Same concept with basketball, I mean you have to go to the game, but that's not the only thing, you have to actually be engaged to learn what's going on. So, without having your mind focused and engaged on what's happening, you're not going to fully understand the game. (Alex)

The comparison of basketball with school indicates that plainly watching basketball is not enough in order to fully understand the game. Engagement, whether it is in the form of studying, playing, reading, etc., is necessarily in order to succeed in accurately and effectively watching basketball.

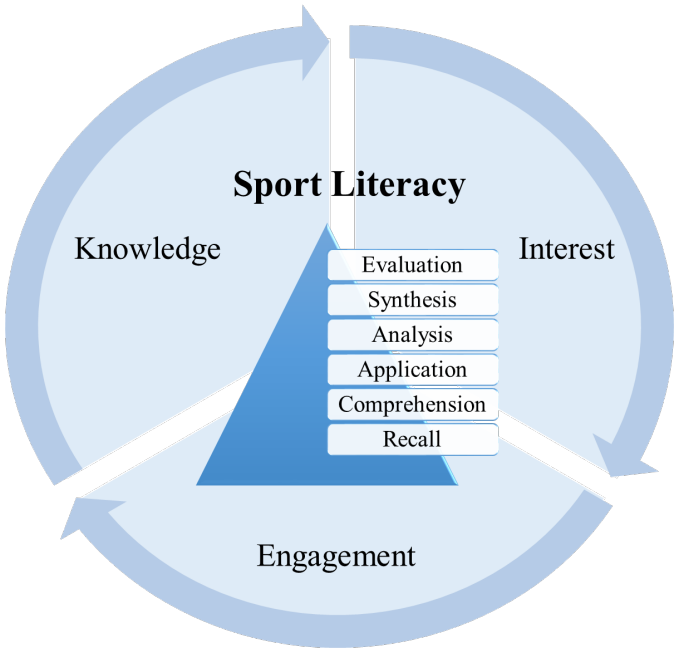

Figure 4. Sport literacy development model

Figure 4 illustrates the conceptual framework generated by this study. The sequential process of literacy development is displayed, following a revised version of Bloom's taxonomy of learning. Six steps in the process of literacy development are involved with both hands-on knowledge and context knowledge in which arrows indicate the knowledge components that could serve to support each step in the developmental model.

Entrance in basketball

Most of the participants' sport literacy development began in their early ages, 5 or 8, being mostly affected by significant others such as their father, brother or sister, and/or friends. Entering into basketball varies by their backgrounds where some started by participating in games while others engaged with basketball through watching college or professional basketball games. Although not all participants played on an elite level, the development process was similar to the experience of those who participated in sport had their development grow in sport literacy at the beginning stages.

Advancing basketball literacy

All participants pointed out that coaches or commentators are important resources for them to develop their literacy, particularly when they both started with watching and playing basketball. These mentors played a significant role when they didn't understand what's going on in the game, especially with new situations or issues that they encounter when watching the game. While growing their literacy, they started to engage themselves with books, articles, media, and websites in order to fulfill their interests, resulting in them understanding the details about the game and background as well as be able to analyze, discuss and communicate with others with accurate and fruitful explanations. This meta cognition of what they have to know and where to get information are found in the interviews.

Experts' opinions on the development of sport literacy

The level of being literate in college basketball is also described with relationship to the participant's motivation. Six participants commonly pointed out that spectators don't have to be as literate as an expert such as athletes or coaches. Because they can enjoy watching the game without details of knowledge if their purpose is to just engage in the game and watch for fun within their knowledge level.

> I think it kind of depends on what you're trying to get out of the game. If you're just trying to go enjoy time with friends I don't think that you necessarily have to be able to understand oh that was a pick and roll over there, pick and pop, whatever it may be. So, if you're going for that I would say that just the general knowledge about the basket. It was a travel, he fouled, I think that's good. But if you want to be just more engaged in the game and focused on what is going on court, then you need to have a pretty high basketball IQ, knowing what type plays are being run, what formation on offense and defense they're playing (Alex)

> I don't think that it's vital that you know so much about the sport when you watch it, you know at the end of the day it's about what you get out of it when you watch it. If you like it, like it'll be strange to me like, um, try to force somebody to like learn something if they're fine. With that said, yeah, you might get a lot more out of it by learning more about the sport, but that should also in my opinion come naturally if you're interested enough (Andrew)

However, six other participants also asserted that spectators should still equip themselves with high-level knowledge in order to watch the game. This is because they think that knowing the situation in the game and connecting the knowledge with the scene is part of appreciating the game. Also, knowledge would provide opportunities for people to get together through communicating with one another.

> I think it's important from the perspective that I can fully appreciate what's going on. Like I grew up going to games with three tickets. So it was my dad, my stepmom, and myself. I had to understand like triangle two defense or like 2, 3 zone where my stepmom was just clueless. She wouldn't understand why a team would scoring or started scoring just based on the simple chance of defense. I think I mean that's fairly intricate but if you understand stuff like that you

> appreciate it even more and you'll understand the like what sort of nuances better than just a casual observer. (Joshua)
>
> I guess this isn't basketball, like an analogy from my good friend that I know now from playing fantasy football, it will be very similar. He never knew anything what we're talking about before we used to talk about sports. Always, never had any idea. So, we started playing fantasy, and so now he watches, and the more more he's watching more he's learning kind of what's going on and now he can talk with us about it and he loves it. And so now I think he's just watching more and more football which is, I think that's a pretty accurate. And learning the rules and actually understand the game and being able to talk with us, like oh did you see this did you see that, that was really cool you know all that. And now he watches more so I guess yeah, his interest is way up. (Steve)

Relationship between participation and spectating

Although participants identified that spectators can reach certain level of sport literacy without actual participation in sport, participating in a sport played a critical role in developing their sport literacy. Particularly, the experience in actual play involved with the nuance and details of the game understanding. For example, if one has played college basketball and has the ability to link his or her experience and given situation when watching college basketball, they can not only get the player perspective but also understand how difficult it is or why players are making all those plays. Therefore, sport participation is not a necessary component but a facilitator for developing sport literacy.

> So a lot of it would be because you um, because you played in a certain way because you were a defensive specialist, because you put a lot of energy into the game. It's really gratifying for you to watch someone that is a defensive specialist that puts in effort. You feel something there, maybe over a guy that is dunking over people. Maybe you dunked over people, but more so the defensive specialist...So that's something that's specifically somebody that has played that can relate to that and of course somebody that hasn't played can missed that cause they can't experience that. But those are things that you wouldn't miss cause they're personal qualities as well. (Alex)
>
> Cause you know like when you play, when you know how to play basketball instead of you being a spectator you're actually on the court with them, so it depends also how they film the game. If they film the game where you can see the

> whole court then you can actually be on the court with the team watching them do their stuff and go like oh, why did he do that he had this person open or you know so...actual playing, that's important so to become you know more literate. Cause like, yeah, also like having a coach, a coach is important too you know. (John)

> I mean I know a lot of people that have made their living off of just watching it and learning it that way. I mean so most of these reporters have done that and a lot of them, they just watch a lot and they just study it, study the film, which is another big way that you learn from experience. When you go play, when I played in high school, we played a lot but then also we spent a lot of time watching our games and seeing what we did wrong and stuff like that, so yeah. I think that people can learn like that, just watching, definitely, cause people I mean all these announcers have done that, most of them. (Steve)

> Maybe you're getting your answers from maybe not a great source, or someone that really didn't play themselves, um, it's hard to learn about a sport, if you've never played it or if you never um sought the knowledge I guess, so you know, I didn't really know a whole lot about soccer at all until I started to really watching and really surrounding myself with people that did know, and that had been there you know, and I tried to start playing the sport myself to really understand it and now I can understand it so much better than I did before (Chris)

Having experience in playing basketball allows a spectator to understand a game both on a macro and micro scale. They can relate to and pinpoint certain players and their plays, while also understanding the setup of certain formations and strategies and the difficulties involved with them. This kind of connection has spectators being more involved and devoted in watching games, due to the fact that they can see themselves being there also.

Barriers in developing sport literacy

The study also revealed why people are having difficulties in developing their sport literacy. Coming from participants' experience, 'lack of interests' and/or 'lack of exposure or background' were found as significant barriers.

> I think honestly, people just not wanting to know. Just there to probably be with their friends, they don't really care about the game, um, and that's across all sports. Football, basketball, soccer, tennis, it doesn't matter. They just want to be

there to...I guess to have a social event, they don't really. It's not about the game, it's about the social aspect of the game. (Alex)

The reasoning behind spectating a game to begin with can deter someone from increasing his or her sport literacy levels. If going to a game is a social event with friends or just a way to blow off some steam, then raising their literacy levels will be extremely difficult for they have not came to the game to watch the game, but rather for the environment that the game provides.

...they might not already have enough knowledge for the game (Mike)

Maybe they don't have a background in it or they've never played it...regional, like basketball is, a lot of sports are um, basketball is different from football. Basketball is like historically it's been inner city sport, New York City, Philadelphia, and it's kids that were from typically the better players, it's not that football is the same way it's just lower socio-economic kids and then football players are kind of like a lot from the South or farm kids, who know big bulky lower socio-economic, cause it's like those kinds of sports is not like something, it's not like polo where the royalty people do it, it's the average to below average socio-economic kind of sport, but basketball in the Northeast got a lot of attention because it is, you know a lot of the kids that play are from that area and that's kind of when you look at the US, the southern part is all about football and basketball is the secondary sport, but in the North they don't have the football players you know from Texas or Florida or Alabama or those kinds of places. So basketball is what you're good at and that's what people started to watch. So if you're in Texas it's all about football and that's what you knew when the kids go to school, everything is geared around football so they're just not exposed to basketball. (Peter)

The socio-economic and demographic status of the person can significantly affect their interest levels in the game and further influence their growth of sport literacy. In the south, where football is the dominant sport, basketball is less popular, which leads to it being a lower priority for people to learn about. In the north and Midwest though, basketball is the dominant sport, and people are willing to learn about it due to its heavy influence in the northern regions of the country. Overall, the region and community that

one grew up in can drastically affect the kind of sport literacy they will attain, and which kind of sport literacy they may have a tendency to lean towards in years to come.

Summary of Results

The purpose of this study was to generate a conceptual framework for sport literacy and its components to guide aspiring sport managers in developing a sport literacy assessment for their sport. Substantive categories, HANDS-ON KNOWLEDGE and CONTEXT KNOWLEDGE were generated from a series of investigations that emerged as participants' perspectives and empirical knowledge were explored. Exploration revealed that spectators should have interests in order to retain them with regard to watching the game, and the interests comes from both game knowledge and context knowledge. Particularly, participants were discovering that they had high interests when they had high level of literacy, specifically when a game exceeded their predictions or had unexpected scenes. Sub categories that emerged from the study provided various examples and can serve to guide sport managers in developing knowledge components when designing their assessment.

DISCUSSION

This study has shown the importance of being literate in sports with regard to the likelihood and experience that spectators will receive when watching sports. Due to an influx of declining spectators, organizations have sought out for methods and approaches that could help sport managers in recruiting and retaining spectators, mainly by creating meaningful experiences for the spectators both inside and outside of the game. However, there is a lack of literature and presence of frameworks that could well document the conceptual model of sport literacy, specifically components or domains that spectators should be equipped with. The need for this case study of college basketball literacy has

not only lead to conceptually understanding sport literacy but has provided a framework that categorizes specific knowledge components as well. Based on college basketball experts' experiences, the specific elements of sport literacy and examples were documented and described. A discussion of the findings of this study begins with the conceptual understanding of sports literacy and proceeds to review the key findings with corresponding core categories. The discussion ends with a review of literature in sport management and education. Further implications of the findings from this study for sport managers also explored.

Conceptualization of Sport Literacy

Defining the term 'sport literacy' within a theoretical perspective was the first issue addressed in this study. As reviewed in chapter 2, since the term was initially grounded in the context of physical education and evolved throughout the development of its usage, sport literacy has mainly been focused on the process of learning a set of skills and knowledge and instilling meaning to them through sport participation (Arnold, 1979; Pill, 2009). This concept could be partially compatible to the concept of physical literacy, which was developed to understand individual development (Hayden-Davies, 2005; Higgs et al., 2008; Whitehead, 2007). The definition of physical literacy provided by the Canadian Sport Center is:

> The mastering of fundamental movement skills and fundamental sport skills that permit a child to read their environment and make appropriate decisions, allowing them to move confidently and with control in a wide range of physical activity situations (Higgs et al., 2008, p. 7)

However, it does not provide a concrete definition of what sport literacy means in our modern day society. If the concept of 'sport literacy' is just limited in having the ability to physically perform sports and have a grasp of its related knowledge, the term

itself couldn't be differentiated with terms like sport expertise, sport competencies, or proficiency which are already being used in scholarship (Fox & Corbin, 1989; Whitehead 1995). From a theoretical perspective, the word 'literacy' should be used in the context of linguistics as well as extending its meaning throughout the context of sport on a broader level (Olson & Torrance, 2009). That is, the new definition of sport literacy should involve the nature of facets for consumption, and high comprehension levels of understanding plays and spectating in general. Particularly, it should be separate from evaluating the ability to perform a sport, it should be the ability to understand and communicate about the knowledge that surrounds the sport contexts and knowing the situated the core product, the game itself.

The study results support this notion of conceptual understanding of sport literacy. All participants agreed that sport literacy should be also understood in the context of the situation, in particular the appreciation people have of the game. To reach this point, it has been clear that sport knowledge is a vital component that people need to know about in order to increase their overall sport experience, (e.g., fun interest, engagement, excitement). These findings are consistent with other works in suggesting that the term sport literacy should be meant for its functional usage (Jones, Armour, & Potrac, 2003; Pill, 2010). Thus, the study confirms that the definition of sport literacy is the "understanding of context and content knowledge as well as the ability to read, analyze, and interpret sport games and play in a form that deepens the spectating experiences." from chapter 2.

A recurrent and important aspect that has been identified in this study for sports literacy is that all the participants have cited sport literacy as a learning process. An analogy of 'mastery of learning' by Bloom (1956), a classic educational theory, may be useful to understand the concept of sport literacy. Bloom described the learning

progression of a certain topic by specifying the elements for its mastery. An early article that described the process of learning by Bloom provided a guidance of forming an analytical framework for sport literacy. He has cemented a specific perspective in viewing the learning process as a continuum and posing the significance of applying this process to develop curriculum and other educational models. His model, reviewed in chapter 2, had six key elements: 1) recall; 2) comprehension; 3) application; 4) analysis; 5) synthesis; and 6) evaluation for mastery of learning were identified and confirmed within this research. In the sport literacy model which is an extended model, 1) recall; recall the hands-on knowledge and context knowledge, 2) comprehension; ability to interpret, reproduce, and communicate about the game plays and historical/cultural backgrounds, 3) application; use of knowledge in game settings when either playing or watching the sport. Understanding the statistical value of players and teams and their styles of play, 4) analysis; ability to analyze the game plays and statistics. Being able to understand the significance of various components and effectively predict what will happen, 5) synthesis; ability to bring together knowledge and plays from the game. Being able to understand the game on a broader scale and understand its longevity in its current setting, and 6) evaluation; ability to evaluate the plays and strategies, furthermore be able to provide accurate comments about changes in the sport that could benefit it.

Benefits of Sport Literacy

Another discussion point pertains to the importance of being literate while watching the game. A majority of interviewees (75%) asserted that spectators should have a certain amount of knowledge to understand and appreciate the game. It is evident that having knowledge about sport and its context would enhance their experience, increase their interest, or even meet their expectations. Also, they reported that those

experiences help continue to increase their literacy and corresponding behaviors and vice versa. These findings are consistent with other studies that have reported the benefit of being literate, enhancing knowledge acquisition (Hidi, 1990; Schiefele, 1991), decision making, and expansion of knowledge (Wilson, 1999). One interesting finding among the literature for benefits of being literate is that literacy would effectively help in communicating with others, which is a crucial aspect when it comes to appreciating the game. This becomes a key characteristic that is commonly shared among people who are literate in sport in which the sport literates are able to explain and deliver knowledge and experience to other people who are not familiar with the sport. Thus, from a management perspective, having more literate people could be an asset for the development of sport.

This multiple case research study has revealed the by-product need of sport literacy, which is communal connections and social acceptance. On the basis of Siedentop (1994)'s study, being literate in sport may influence on how one might identify the social structure that surrounds a sport, including letting people enter and take part in a particular sport subculture. In order to be involved in sports community, they should acquire knowledge about sports and should be able to talk with people who are involved in sports, learn how they think about the sport and expect equal respect, whether negative or positive, for each other. This illustrates that literacy plays a critical role in interactive socialization and the identification formation process. Like a cycle, knowledge and literacy enhances sport experience and vice versa, and this aspect is highlighted and confirmed by the majority of the interviewees.

However, while four interviewees agreed that knowledge definitely helps the appreciation of the game, not all spectators are necessarily required to be literate in order to appreciate the game. Because, the experience or expectation of the game could be different by their purpose of spectating or the level enjoyment they feel. On occasions,

they completely ignore the small details of the game rather just enjoying the atmosphere of the game. Some will focus on the sport itself, while others may take more interest in the event itself. This could be explained through the motivation theory of sport spectating where people watch the games with different motivations (Funk, Mahony, & Ridinger, 2002; Trail & James, 2001). Then it is fair to discuss and venture forward on how knowledge could affect the spectator's experience with regard to appreciation for the sport and their own enjoyment level. In order to obtain this kind of insight on the relationship between knowledge and interest, we need to examine in detail with a particular setting, which will be discussed in the next chapter.

As shown in the results, from the expert's view, being literate does not just mean knowing how to play sports but also means knowing about what's going on, what contexts are they situated in, and what are the things that they should be focused upon. In addition, all experts emphasized that being literate means they that they are able to talk, interpret, analyze, and predict the game, which represents a layer of knowledge that addresses the concept of sport literacy. More over, the evidence from this study supports that literacy can't just be learned from a book, but you need to put in the hours. It can be comparable to the difference in learning math from a textbook versus learning to drive. These are somewhat unique findings compared to previous studies on sport literacy. According to Clegg & Bailey (2007), sport literacy can be defined as understanding the factual knowledge of the game. However, the current study suggests that being literate in sport is part of a learning process, which is consistent with classic educational theories such as mastery of learning (Anderson & Krathwohl, 2001; Bloom, 1956; Fink, 2003). This approach has been applied to explore the knowledge categories and components that could possibly increase interests of the game within this study. Through this educational approach of developing one's sport literacy, sport managers could recruit and retain more

spectators, as the necessary components that enhance the appreciation of the game are being developed and distributed.

Difference between Experts and Novices

Findings from this study revealed that there were clear differences between experts and novices. The participants in this study were more equipped to appreciate the game and understand and access necessary information as their experience increased (Fink, 2003). These findings were consistent with the previous literature in describing the difference between experts and novices in a sport setting. From the experts' perspective, literacy functions differently compared to the novices. As seen in the results, most of the experts cited that watching sports is similar to a cross learning process, a particular example being the execution of a goal, whereas an extra pass, an extra screen or hustling on the court may seem "cool" or a high level play for novices, but the reality is that those movements are not necessarily always seen as a good play. The experts described that being literate helped them make adjustments and analyze, predict, and synthesize the game by facilitating their spectating experience, which could affect their post-game behaviors in sport. This process of literacy, experience, and behaviors should be further investigated to clarify and elaborate on sport spectating.

Core Knowledge and Experts' Views

The main finding of this study suggests an extension for the concept of sport literacy as well as its elements. As seen in the original article defining sport literacy by Pill (2009, 2014), the content knowledge regarding sport literacy was restricted within the context of physical education. Due to its nature of being initiated in PE, the concept itself couldn't properly explain and reflect the aspects of spectating since literacy is more synonymous with linguistics rather than physical activity. Also, previous literature failed

to categorize these knowledge components, whereas this research provided evidence that will be helpful in re-conceptualizing this concept. The first upper category is HANDS-ON KNOWLEDGE, which is related to the game component, where the rules, skills and drills, strategies, and terminology are found to be the foundational elements in appreciating sport. Although these elements were somewhat an expected outcome, the study confirmed and provided examples of each lower category (RULES, SKILLS AND DRILLS, STRATEGY, and TERMINOLOGY) helping in designing a curriculum for college basketball (French & Thomas, 1987; Iglesias, Moreno, Santos-Rosa, Cervelló, & Villar, 2005; Spilich, Vesonder, Chiesi, & Voss, 1979). The difference between the current categorization that is suggested and physical education curriculum is the focus of learning. While physical education curriculum focuses on the physical activities of learning how to start playing basketball and ultimately mastering it, our study suggests that learning sports is also important and influential when watching a game.

The necessary knowledge that is required for watching a game could possibly be aligned or overlapped with previous curriculum knowledge or experience, which indicates that this cross-disciplinary approach would be a better option in becoming literate. For example, in PE, students learn how to play basketball all the way from how they should handle the ball, shoot, and pass, while our curriculum suggests that they should be learning on why they are moving the ball and what are the elements that is needed to understand other players' movements and be able to provide an articulate explanation of it. This would provide some insights about the development of sport, which in conclusion would be the continuous creation of literate people in sports, specifically basketball for this study. From statistics, basketball is perceived to be one of the most popular sport in America, but it is still having difficulty in recruiting spectators at collegiate level (Patterson, 2014; Steinbach, 2012). The number of fans that watches

the college basketball is actually quite low in comparison with professional basketball. This could be due to the fact that there is interest in the sport itself, but not enough for people to proactively spectate or experience the sport. This perceived façade of low viewership could cause fans to lose interest in the sport, which could lead to a domino effect of people choosing not to watch basketball. This perspective is also supported by literature where if one couldn't update their knowledge then they may lose their interest (Kintsch, 1980). So, it is evident that providing interesting or necessary knowledge that fits and corresponds with the spectator's level would be recommended for sport managers in recruiting and retaining their consumers. With that being said, the challenge will be the identification of the spectator's level of literacy and identifying the components of this knowledge domain. The following study 2 attempts to challenge this issue.

Another important facet of sports literacy is that spectators should be equipped with CONTEXT KNOWLEDGE. From the study, all participants claimed that context knowledge is a critical part of being literate in sports, where history and culture, statistics, and organizational structure create interest for the viewer and encourages them to continue to watch basketball. It is an interesting point because these results could possibly explain the gaps on why people are not watching or are not interested in the game compared to people who are consistently watching the game. They might have a discontinuation of the knowledge acquisition or couldn't find the point that creates interest or enhances their appreciation of the game. Thus, the current finding could provide a clue in developing and designing materials that could potentially help people by knowing what knowledge is needed in order to enjoy watching the game. And also, arguably, sports managers need to know that what we believe is basic knowledge for novices may not always work, so it is important to identify knowledge components that

could work in real-life settings. This could be further examined by group comparisons among different knowledge levels and analyzing their spectating patterns.

The results of this study are also supported by the expert-novice theory. As noted in Singer and Janelle (1999), the experts in this study: 1) have greater knowledge; 2) interpret greater meanings from available information; 3) store and access knowledge more effectively; 4) have better prediction around situational probabilities; and 5) have rapid and more appropriate decision-making. Interestingly, all participants continued to update their knowledge, specifically context knowledge. This implies that context knowledge could be a key factor for retention. And also the study found that, on expert level, content knowledge, which helps analyze and predict the game creates the excitement and interest for experts. This confirms the findings from previous literature in which the ability to read and interpret the game varies from the level of engagement in sports (McPherson, 1999).

Although the relationship between knowledge and interest was only found in the expert population, the study result was supported by cognitive-affective consistency theory. All participants mentioned that their level of interest increased as their knowledge level increases. Particularly, the increased level of interests increases the need for improving the knowledge. However, this study couldn't find the inverted U-shape relationship within the population. According to Kintsch (1999), as level of knowledge reaches a certain level the interest goes down as their knowledge increases. However, this study found that the men's college basketball still has an upward ceiling of interest for experts due to the fact that the nature of this event has uncertainty and it is being played by premature athletes, which tends to create a volatile but exciting game. This creates another viewpoint for watching the game where their knowledge is still engaged by their constant predictions of what the outcomes will be and explaining their reasoning in some

meaningful way. This suggests that the relationship between interest and knowledge may be unique in the sport context.

LIMITATIONS

Given the exploratory nature of this study, the results provide a foundation for the development of a robust theoretical framework for sport literacy. As the results of this study attest, the previous literature addressing sport literacy was limited in explaining one's ability for utilizing sport knowledge for spectating. This study redefined the concept of sport literacy and identified relevant components based on empirical evidence where there has been a lack of empirical precedent studies. In spite of the relative strength of the results, there are several limitations which further add cautions to any conclusion. First, the homogeneity of participants' background may affect external validity of the finding. For example, the participants were composed of a majority of Caucasian males who have a strong background in basketball experience. This may have impacted their beliefs in conceptualizing sport literacy and identifying related components. The results show that participants have strong beliefs about being literate in basketball in order to experience the full immersive and professional nature of basketball. For example, it is their belief that there is some implicit knowledge which only they can understand due to their experiences in practical exercise or training. One other example pertains to the relative difficulty or ease of motion a player performs. They believe that only cumulative knowledge of basketball can help one understand such movements and plays in a basketball game. Most of the participants spoke in a unified voice on the significance of sport participation for literacy. The barriers for novices in spectating basketball they believe were fairly homogeneous, which could be due to their similar backgrounds and expertise. Therefore, future research will need to be conducted to

investigate the diverse backgrounds of the participants regarding ethnicity, gender, and occupation.

Second, while this study explores the concept of sport literacy, the conceptualization of sport literacy should be interpreted within a limited setting. This study used basketball as a case to develop a theoretical framework. Since basketball is one of the most popular sports, garnering a large number of participants and spectator, this framework can only be applied in sport settings that are similar to basketball with regard to both spectating and participation. Does context knowledge matter when one is participating in a sport? Does a spectator need to be knowledgeable in order to spectate a sport? Although the results of this study have revealed that context and content knowledge are necessary when participating or spectating a sport, these types of discussion questions will need to be addressed, future studies with empirical evidence, when trying to apply such a framework to a different sport. In fact, the concept of literacy presented in this study solely focuses on increasing consumers' sport literacy in the context of spectating. Further study in various sport settings will lead to the eventual extension of the boundary on the concept of sport literacy as well as strengthening the theoretical framework.

Lastly, the identified literacy components may be limited to the participants' personal experience. This may vary across their spectating years, positions and levels they played, and affiliated teams. Thus, the examples drawn in this study cannot be generalized as a set of rules in learning basketball. Although identified lists of examples were consented by other experts, there are still some inconsistency that remains regarding which are more or less important or interesting knowledge that spectators should pursue. This is due to a given nature of aggregating qualitative data from interviews. In order to counteract this, additional investigations through more experts are requested.

Chapter 4: Developing a Sport Literacy Assessment (Phase II)

Spectators are a vital element of almost all professional sport organizations. A better understanding of the factors that attract spectators to the sport games as well as factors that enhance the game experiences may help sport managers to develop strategies for recruiting and retaining spectators. From the literature, understanding the level of spectators' literacy will provide not only theoretical contributions but also practical implications for designing sport events and programs.

The second phase of this dissertation is to develop a valid assessment for measuring sport literacy, using a case of college basketball among college students. The study is founded in the conceptual framework developed in chapter 3. As sport literacy can be applied in various sport settings as the current study investigates how a sample of college students at a major southwestern university obtain/retain college basketball literacy. This chapter describes the research design, settings, population and samples, data collection, and analysis procedures for the instrumentation process. Following the assessment development, the study examines the psychometric properties of college basketball literacy assessment (CBLA), gathering evidence of the construct validity of the assessment from developed items and providing a model to facilitate the measurement of sport literacy.

RESEARCH QUESTIONS

This study aims to (a) develop a psychometrically robust assessment to measure the level of college students' sport literacy in the context of men's college basketball, (b) measure their college basketball literacy through the developed CBLA and (c) evaluate psychometric properties of the CBLA items to establish the construct validity of the CBLA using Item Response Theory. The research questions for this study are as follows:

1. How valid and reliable is the developed assessment for measuring college basketball literacy? To answer this question, several sub-questions were examined to provide construct validity evidence.
    a. Does the content validity index (CVI) evidence support the CBLA items?
    b. What are the characteristics of the CBLA items?
        i. Rasch assumptions (unidimensionality, local independence)
        ii. Model-data fit
        iii. Item measure, person measure, subcategory estimate
    c. How are the item, subcategory, and person estimates separated along the CBLA?
    d. Does item difficulty differ across gender and test groups (i.e., UT and non-UT)?
2. How are the characteristics of students' college basketball literacy associated with gender, grade levels, ethnicity, and sport experience?

METHODS

Evidence-centered design (ECD), proposed by Mislevy and Haertel (2006), was applied in developing the college basketball literacy assessment (CBLA). ECD provides a systematic framework for designing an assessment that supports an evidentiary argument (Mislevy, Steinberg, Almond, & Lukas, 2006; Mislevy, Almond, & Lukas, 2003). Through examination, communications, and observations of individuals, this approach allows us to draw inferences about what individuals know, can do, or have in common. ECD is often assumed to be a cornerstone of test validation in the instrumentation process whereas this approach is essential in argumentation of the developed measurements (Kane, 1992, Messick, 1989). Mislevy and Haertel applied this perspective in the

development of five layers to rationalize the complex process when designing, implementing, and delivering an educational assessment. Each layer is characterized by its critical step within the assessment development process, showing the key concepts, tools, and entities used at each layer. The five layers are domain analysis, domain modeling, conceptual assessment framework, assessment implementation, and assessment delivery. The layers propose not only a sequential design process, but also a process of iteration and refinement both within and across layers. This section describes the design process of assessment, which was developed in this study by adapting the ECD layers and their roles, key entities, and examples of knowledge representations. Table 4 shows the layers of ECD adapted from Mislevy & Haertel (2006) and a summary of their roles and key entities.

Table 4. Layers of Evidence Centered Design (ECD) for assessments (adapted from Mislevy & Haertel (2006, p. 4)

Layer	Role	Key Entities
Domain Analysis	Gather substantive information about the domain of interest that has direct implications for assessment; how knowledge is constructed, acquired, used, and communicated.	Domain concepts; terminology; tools; knowledge representations; analyses; situations of use; patterns of interaction.
Domain Modeling	Express assessment argument in narrative form based on information from domain analysis.	Knowledge, skills and abilities; characteristic and variable task features, potential work products, and potential observations.
Conceptual Assessment Framework	Express assessment argument in structures and specifications for tasks and tests, evaluation procedures, measurement models.	Student, evidence, and task models; student, observable, and task variables; rubrics; measurement models; test assembly specifications; templates and task specifications
Assessment Implementation	Implement assessment, including presentation ready tasks and calibrated measurement models.	Task materials (including all materials, tools, affordances); pilot test data to hone evaluation procedures and fit measurement models.
Assessment Delivery	Coordinate interactions of students and tasks: task-and test-level scoring; reporting	Tasks as presented; work products as created; scores as evaluated.

Domain Analysis

Mislevy and Haertel (2006, p. 5) noted: "The domain analysis layer requires gathering substantive information about the domain that is to be assessed." As the current sport literacy assessment was designed to measure basketball literacy at the college level, I focused on gathering information about the concepts, terminologies, and representational forms of the context of sport spectating in designing the test items. The

domain analysis was grounded in the conceptual framework developed in the phase 1 with exemplary elements derived from content experts. Documents such as basketball tests in physical education were also reviewed as a starting point to calibrate the content domain of the assessment. I calibrated the features of items in the previous knowledge assessment literature to identify the kinds of knowledge, skills, and abilities.

Following the guide of Mislevy and Riconscente (2006), I adopted a behavioral, information processing, and sociocultural perspective in the overall process of instrumentation to accomplish coherence in the assessment argument. In sport spectating, a behavioral perspective would deliver evidence from the assessment that students could use their sport knowledge to understand, analyze, and interpret the game situation. Designing an assessment from an information processing perspective provides a structure of knowledge components in understanding sport spectating. In addition, a sociocultural perspective so that the method employed in this study could possibly be applied) to other fields of sport context. Being aware of these perspectives served as a guideline for finding out how students become proficient in spectating domains and what we need to assess. The following steps were considered in the domain analysis:

1. Who will take the test and for what purpose?
2. What skills and/or areas of knowledge should be tested?
3. How should test takers be able to use their knowledge?
4. What kind of questions should be included? How many of each kind?
5. How long should the test be?

Domain Modeling

'Domain Modeling' layer represents a step for organizing information of related knowledge components discovered from domain analysis. I began with a layout of

substantive sport knowledge for spectating and built a compendium of this knowledge to label target domains within the framework. Adapting Bloom's 'mastery of learning' framework, the college basketball literacy assessment (CBLA) framework was proposed in this study (see Table 5). The framework is composed of two main domains: (1) HANDS-ON KNOWLEDGE and (2) CONTEXT KNOWLEDGE with seven subcategories: (1) RULES; (2) SKILLS AND DRILLS; (3) STRATEGY; (4) TERMINOLOGY; (5) HISTORY AND CULTURE; (6) STATISTICS; (7) ORGANIZATIONAL STRUCTURE. For each structure of the assessment, I provided examples of particular knowledge components and explained why these examples fit into the framework. According to Mislevy and Haertel's (2006) study, the role of design patterns, forming themes and identifying the layer of knowledge structures, is important when developing an assessment for measuring one's proficiency in a given subject. Design patterns are often used in expertise research. This study assumes that people with distinctive knowledge levels may have different approaches in completing the given tasks. The goal of this step is to find patterns among the sport experts' perspectives and knowledge layers that are important for enjoying sport on a superior level. I collaborated with an item development committee including two basketball experts, two sport management faculty members, and one assessment expert to identify the knowledge, skills, and abilities for a sport literacy framework and developed assessment item pools by mapping the themes and contents for sport spectating. The responsibilities of this committee were to define test objectives and specifications. The domains of sport literacy in this dissertation were checked and achieved a consensus among these experts. The test items and categories are unbiased and valid. The committee also determined the test format. A multiple-choice format was used in this study. The domain modeling and specification for this study is shown in the results section.

Table 5. College basketball literacy assessment framework

Bloom's Learning Model	Sport Literacy Model
Recalling:	
Recall data or information.	Recall the hands-on knowledge and context knowledge.
Comprehension:	
Understand the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words.	Ability to interpret, reproduce, and communicate about the game plays and historical/cultural backgrounds.
Application:	
Use a concept in a new situation or unprompted use of an abstraction. Apply what was learned in the classroom into novel situations in the work place.	Use of knowledge in game settings when either playing or watching the sport. Understanding the statistical value of players and teams and their styles of play.
Analysis:	
Separate material or concepts into component parts so that its organizational structure may be understood. Distinguish between facts and inferences.	Ability to analyze the game plays and statistics. Being able to understand the significance of various components and effectively predict what will happen.
Synthesis:	
Build a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure	Ability to put knowledge and plays from the game together. Being able to understand the game on a broader scale and understand its longevity in its current setting.
Evaluation:	
Make judgments about the value of ideas or materials.	Ability to evaluate the plays and strategies, furthermore be able to provide accurate comments about changes in the sport that could benefit it.

Conceptual Assessment Framework

Based on the domain-modeling layer, I coordinated machinery pieces (e.g., measurement models, research protocols, and scoring methods) to design the sport literacy assessment. A person's sport literacy should be consistent with the conception of sport knowledge in spectating, in which the features and contents of assessment were guided by discussions in domain modeling. For achieving the methodological and

systematic coherence in developing the assessment, the Mislevy's Student Model was used to capture students' level of college basketball literacy. The Student Model addresses "what the assessment designer is trying to measure as expressed in terms of one or more variables that reflect aspects of students' proficiencies." (Mislevy & Haertel, 2006, p. 15). As sport literacy is a single construct that best serves for the purpose of assessment, the Student Model was appropriate as a measurement model for designing the items within the domain of tasks. This model examines patterns of proficiency from complex performance which suggests the mixes of tasks in designing the items by difference levels of difficulties.

The item development was composed of item design (domain specification and item generation) and item review. Item design was led by the item development committee (i.e., researcher, three content experts) and reviewed numerous times and revised to ensure for its clarity. All items were multiple-choice with five answer choices per item. The answer choices were developed through similar reviews so that there is only one correct answer for each item. For the current multiple-choice items, I provided 'right' or 'wrong' answer questions with five example answer choices. The items pools were drawn from relevant literature, expert interviews, and four video clips of NCAA tournament. MC items were valued as '0' and '1'.

Item review was conducted by six additional content experts to see whether each item was appropriate to meet the content validity. These experts are two former basketball players, two coaches, and two sport management faculty members). Adapting Lynn (1986)'s guideline, the content validity index (CVI) was used to examine the content validity of assessment items. The CVI is a method that provides validity evidence by quantifying experts' level of agreement on each item for establishing validity. Lynn (1986, p. 384) proposed a four-option rating scale to present the relevancy of items (4 =

very relevant and succinct; 3 = relevant but need minor alteration; 2 = unable to assess relevance without item revision or item is in need of so much revision that it would no longer be relevant; 1 = not relevant). The content experts were asked to judge each item based on this criterion, and further describe any revisions or feedback for its improvement. Table 6 summarizes the proportion of experts whose endorsement is required to establish content validity (above the line) beyond the 0.05 level of significance (Lynn, 1986, p. 384). Based on this criterion, the study used 0.83 (a criterion for 6 experts) as a cut-off point for establishing the content validity of current assessment. The CVI values were computed by the number of valid rating (3 or 4) divided by the number of experts. If the item did not reach the required agreement level, the items were considered to be revised or removed from the assessment. The reviewers were asked to mark how relevant each item was within each subcategory and how well it matched with the overall college basketball literacy concept. After the items were removed and revised, all items were pretested by a group of 10 students which is similar to the population of this study. The pretest procedure provided additional information on whether items were ambiguous or misleading.

Table 6. Content Validity Index (adapted from Lynn, 1986, p. 384)

Number of experts	Number of experts endorsing item as content valid								
	2	3	4	5	6	7	8	9	10
2	1.00								
3	0.67	1.00							
4	0.50	0.75	1.00						
5	0.40	0.60	0.80	1.00					
6	0.33	0.50	0.67	0.83	1.00				
7	0.29	0.43	0.57	0.71	0.86	1.00			
8	0.25	0.38	0.50	0.63	0.75	0.88	1.00		
9	0.22	0.33	0.44	0.56	0.67	0.78	0.89	1.00	
10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00

Assessment Implementation

The scores that the students received on the current sport literacy assessment provided sport managers, test developers, and program designers with test information that can be used to further enhance sport literacy measurement. Two factors that dictated the shuffling of information were construct validation and the usage of the Rasch measurement model. For the first factor, it is crucial to validate the items of the assessment as variables that could indicate the mastery level of the test takers. Also, not only does it need to present an accurate representation of the examinee's level of literacy, but it should also provide sport managers and program designers with a decent range of what it will take to fully appreciate the games. For this reason, predictive validity was examined (Cronbach & Meehl, 1955). This would be validated by collecting students' basketball experience (e.g., playing and spectating years). By inspecting the correlations between literacy and basketball experience, the predictive validity was examined. The second factor, the Rasch measurement model, is the actual psychometric tool that allows an examiner to create and place various levels of difficulty of items on the assessment. Also, the model enables to design a more accurate measurement of an assessment taker's actual knowledge level. With the two factors mentioned above, it is possible to examine and analyze the parallel relationship between the spectator's knowledge and the assessment items to create a coherent sport literacy assessment. The details of Rasch analysis steps are described in the following section. In addition to the main study, I compared the students' scores from the CBLA with the self-report assessment to examine the gap within the human psyche and the reliability of our instrument.

Analytical Steps of Rasch Analysis

Rasch analysis consisted of several analytical steps including the examination of descriptive statistics, Rasch model assumptions, model-data fit, facet map, item

difficulty, subcategory difficulty, and person ability (college basketball literacy). The WINSTEPS version 3.92.1 (Linacre, 2016a) and Facets (Linacre, 2016b) version 3.71.4 software program were used to calibrate these psychometric properties of the assessment for the Rasch model. Also, IBM SPSS Statistics version 23 (IBM Corp., 2015) and Mplus version 7.4 (Muthén and Muthén, 2016) software programs were used to test several assumptions of the Rasch model, provide descriptive statistics, and examine the group difference in students' level of college basketball literacy (i.e., correlations, t-test, analysis of variance).

Descriptive statistics

The descriptive statistics aims to summarize basic information of the data. This includes item information (e.g., number of items for each category, total scores, mean score, etc.), the characteristics of students regarding their gender, grade level, and ethnicity.

Assumptions of Rasch analysis

There are two critical assumptions with IRT models: unidimensionality and local independence (Embretson & Reise, 2000). With the essential unidimensionality assumption, only one latent ability, called the dominant latent ability, is needed to account for test performance. Thus, only one dominant latent ability is needed to model item responses, even though minor dimensions are present in the data.

Unidimensionality. The dimensionality of CBLA items was examined by three approaches using Mplus and WINSTEPS software programs. One was exploratory factor analysis (EFA) approach, in which if percentage variance of a main single dimension is greater than 20%, the measure is unidimensional (Reckase, 1979). Lord (1980) stated that if the ratio of the first and second eigenvalues was over four times, then the measure is unidimensional. Scree plot was also provided to identify a dominant factor. The second

method to examine the unidimensionality is confirmatory factor analysis (CFA). The fit indices were evaluated using common criteria including (a) loadings of all of the items that are sufficiently large (criterion: loadings > 0.3 and $p < 0.001$), (b) Chi-square (χ^2) value should be not significant or normed chi-square should be less than 2.0 (Ullman, 2001), (c) comparative fit index (CFI) > 0.90 (Hu & Bentler, 1999), (d) Tucker-Lewis index (TLI) > 0.90 (Hu & Bentler, 1999), (e) Root Mean Square Error Approximation (RMSEA) < 0.05 (Hu & Bentler, 1999; Kline, 2015), and (f) Weighted Root Mean Square Residual (WRMR) < 0.95 or 1.00 (Yu, 2002). The third approach is principal component analysis (PCA) of standardized residuals to determine unidimensionality of the measure (Linacre, 1998). If an eigenvalue of the first contrast is less than 2.0, which is considered random errors in the residuals and thus, the measure satisfies the assumption of unidimensionality (Linacre, 1998).

Local independence. Local dependence is evident when covariances in pairs of items are greater than a predicted model. Such a pattern shows that the locally dependent items reflect an additional dimension predicted by the unidimensional model. Because multiple items are connected together to a common passage, items within a unit are not likely to be conditionally independent, which means that the independence assumption might be violated. Violation of local independence leads to overestimates of reliability and underestimates of the standard error of person ability estimate (Sireci et al., 1991). Local independence was assessed by examining Yen's (1993) *Q3* statistic. The *Q3* statistic was obtained by calculating the residual correlations across all individual responses. There are n(n-1)/2 correlation pairs with n being the number of items. There is no golden rule of acceptable *Q3* value but a mean value of *Q3* statistic should be close to -1/(n-1) (Lee et al., 2014; Yen, 1993).

Model-data fit

In Rasch analysis, model fit is used to evaluate how well the data fit the model. The idea of evaluating model fit to data relates quality control of the assessment. For example, a good assessment should have less 'misfitting' items. If a number of students who have low literacy correctly answer a difficult item, the item causes misfit. Also, if an easy item was incorrectly answered by a number of students who have high literacy, this item also causes misfit within the model. By identifying misfit items, the assessment can be improved, resulted in establishing the validity of the assessment.

The model-data fit was evaluated by Infit and Outfit statistics. Infit statistics focus on responses on the items that are more sensitive to the pattern of correct responses on given item difficulty (see Linacre, 2015). Outfit statistics are more sensitive to outliers that indicate how the model misfits with unexpected responses. Technically, Infit and Outfit statistics are chi-square statistics, mean square residuals between observed and expected responses. The criterion for Infit and Outfit statistics is a range between 0.5 and 1.5, suggesting a reasonable fit of the data to the model. The value greater than 1.5 indicates underfit, meaning that there is too much noise in the data (large variation). On the other hand, less than 0.5 shows overfit, meaning model overpredict the data, item is not productive (little variation) (Linacre, 2002; Wright et al., 1994).

Facet map

Facet map is a unique technique that displays person ability estimates (college basketball literacy), subcategory difficulty, and item difficulty on the same common scale. This allows researchers to quickly identify, evaluate, and compare the relative position of each estimate. Facets software program was used to construct and analyze the facet map.

Item measures and person measures

Item measures or the difficulty of an item describes the challenge or easiness of the item for given tasks. Instead of using the proportion of correct answers from overall test scores, Rasch analysis uses the observed probability of correctness from examinees. For the current dichotomous item, the difficulty indicates the points where the item has a 50% chance to correctly answered by the students. Item reliability and separation were examined in addition to the item measures examination. The item measures are estimated in logits scale where high logits score items indicate difficult items and low logits score items indicate easy items. The item reliability shows how well the item estimates a person's ability that intended to measure regarding difficulty. For example, high item reliability means that difficult items measure higher level and easy items measure lower level of ability. Item separation is the degree of distribution of items across the person's ability. If the value of item separation is greater than 2.0, this indicates that items are in an acceptable range for capturing a wide range of person's ability. The difficulty of subcategories was also examined to show which subcategory has the most difficult items and which has the least. The item difficulty and subcategory parameters were estimated in logits. The higher logits score means that the item and subcategory are more difficult for students than those with lower scores.

Person measures indicate the individual level of college basketball literacy. Instead of using total scores, individual literacy levels were estimated in logits scale, considering the students' probability of correct responses for the overall assessment. The higher logits scores indicate high literacy and low logits scores mean low literacy. Person reliability and separation index were also examined.

Differential item functioning (DIF)

The purpose of DIF examination is to identify any measurement bias with respect to the group difference. Gender and test groups (i.e., UT students and non-UT students) were considered to examine the DIF within the CBLA. For example, are the questions correctly answered by all male or all female? Or do UT students perform better in specific items than non-UT student? The Mantel-Haenszel (M-H) DIF criterion (> 0.64 logits) was used at alpha level 0.001.

Assessment Delivery

This step includes the assessment distribution, data collection process, and evaluation of the assessment. The CBLA was administered to students who are enrolled in the southwestern university, the University of Texas (UT), as well as other three universities (University of Tennessee, Old Dominion University, and East Carolina University) for initial validation and checking for differential item functioning of the instrument items between groups. Permission to collect the data used in this dissertation was granted by the University of Texas at Austin's Institutional Review Board (IRB). All participants were required to speak English and have various backgrounds (e.g., age, gender, grade level, prior experiences). For the pilot test, I collected 10 samples to obtain information such as time consumption, item phrases, or any potential problems in using the assessment prior to the main study. For the main study, a total of 382 students participated in the research, which has a larger number than the minimum number of sample size (n = 200) to derive an acceptable statistical power in using Rasch analysis (Linacre, 2007). The participants were recruited through UT student webpages, department coordinators, and direct emails to voluntarily participate in this assessment. The participants were invited to online survey testing procedure with time restrictions.

The testing time was estimated by the pilot test and the test takers were expected to complete the test in about 20 minutes. After the test was administered, I reviewed it to make sure that all the items were working as intended.

RESULTS

The purpose of this study was to develop a college basketball literacy assessment (CBLA) and to examine the validity of the assessment. This section describes the results of the specific instrumentation process of the CBLA and its validation. The first part describes how the assessment items were developed. The second part provides psychometric properties of the CBLA, using Rasch Analysis.

Item Development

Domain analysis

The instrumentation starts with gathering information about who will take the exam and where this assessment will be used. The target population for the current assessment is college students who watch men's college basketball games or do not watch but have potential to watch them. This information may benefit sport managers in assessing consumer behaviors based on students' level of literacy as well in developing educational programs and materials. The college basketball literacy, as defined in chapter 3, is an ability to read, interpret, analyze, and communicate, using necessary knowledge regarding college basketball. In order to be literate in college basketball, students should understand both HANDS-ON KNOWLEDGE and CONTEXT KNOWLEDGE which are specified in the next section. The item pool can have a large number of items to generate the different test forms but 7-8 items per subcategory were determined due to the consideration of the test completion time.

Domain modeling and specification

In developing the CBLA, I sought to measure two main domains with seven subcategories developed in the phase 1: (1) HANDS-ON KNOWLEDGE (RULES, SKILLS AND DRILLS, STRATEGY, and TERMINOLOGY) and (2) CONTEXT KNOWLEDGE (HISTORY AND CULTURE, STATISTICS, and ORGANIZATIONAL STRUCTURE). In addition, Bloom's six learning objectives were considered in the item generation process.

Item generation. 51 initial items were generated based on this CBLA framework using content experts' language, concepts, and knowledge representations. Items for the hands-on knowledge were created to measure particular levels of individuals' college basketball literacy regarding the content of game knowledge and actual playing components. For example, the lower level of the subcategory RULES suggests a more basic recalling of the fundamental rules. So the item, "If player "x" gets fouled shooting a basket inside the arc and misses the basket, what happens next?", was predicted to be an easy to correct item, thereby indicating a lower level 'recalling' of the rules. The item, "What do you have when a defensive player attempts to take a charge with his feet inside the semi-circle of the "paint" area?" was meant to target a comprehension level of rules. This evaluates some ability to understand and reproduce the meaning of game plays.

For SKILLS AND DRILLS, items were generated which would measure individual's understanding of how players are executing from fundamental to advance skills and drills within the game. At the elementary level, there are fundamental offensive and defensive skills and drills that impact the spectating experience. For example, the item "While on offense, how can offensive awareness help players who are off the ball?" was predicted to measure the offensive element, while the item, "Which part of defensive rebounding allows the creation of space against an opponent?" was aimed to the defensive element. While the above items measured an elementary level of literacy, the item, "Which parts

of the setting a screen are necessary to complete a legal screen?" was meant to target medium difficulty of understanding the skills and drills where the item provides steps of screens with more complexity in answer choices.

The STRATEGY items were developed to measure individual's ability to apply the game knowledge in a team level. This element is important for individuals in understanding the dynamics of the game. And this enhances their fun and enjoyment such as how teams are implementing their own strategy. One can evaluate the team's organization, strategy, and performance when they get this knowledge component within various game settings. For example, the item, "Which player would most likely be a collegiate team's center?", requires the basic knowledge about team organization and understanding of basketball positions. The item, "Why would an opposing team most likely trap the ball-handler on a pick and roll?" requires an understanding of a defensive team strategy that is often found in the college basketball level.

The TERMINOLOGY items were generated to measure the how familiar individuals are with the terminology used within the college basketball. Terminology plays an important role in connecting spectators and the game situation through commentators' narratives. The ability to understand use this terminology is an indicator of showing the literacy of spectator. Exemplary questions were drawn from actual game scenes. The item, "What is the meaning of a "field goal"?" requires a basic understanding of the term that describes 'a made basket in the field of play, excluding free throws'. This would be one of the easy items to assess individuals are familiarity with the concept of terminology. The item, "What is the value of a "flop"?" was tested to see whether an individual can understand, judge, and evaluate the game situation that may result in increasing their appreciation of the game.

Items for CONTEXT KNOWLEDGE were created to measure the individual's level of literacy on pre-identified three subcategories: HISTORY AND CULTURE, STATISTICS, and ORGANIZATIONAL STRUCTURE. These categories were also essential components for spectators. The HISTORY AND CULTURE items include background knowledge related to player/team characteristics, stories, rivalries, etc. that may arouse an interests to spectators. In order to get a range of difficulty, diverse examples from content experts were reviewed in this process. For example, the item "How does a university team generally get their basketball players?" requires basic knowledge of player recruitment process that may help to understand about players they watch. The item, "Generally speaking, what would it mean for a team to move from a "Power" conference to a historically "mid-major" conference?" is an advanced question that may require an ability to see the game at a broader level. As the knowing historical events increases the point of interests, the study generated items such as "Who was the player that hit a game-winning turnaround jump shot against Kentucky in the 1992 NCAA Tournament?" that may gauge the college basketball literacy among students.

The STATISTICS items were created to measure an individual knows about statistical terms and their application. The difficulty of these items ranges from a basic level to an advanced level. Some items asked individuals to reproduce the term frequently used in broadcasting while others asked them how they can apply these statistics into the game decision and prediction. For example, the item "What is the meaning of PER?" requires fundamental understanding of statistics. This item indicates whether the students are exposed to or educated about the statistics used in basketball. The item, "If team X beats team Y by shooting 55% from the field and allowing 40% shooting, what deductions can reasonably be made about this game?" requires a more complex

understanding of how to utilize the statistics. This item was meant to grasp the individual's ability in to understand the statistical values of team performance.

Item Review. The 51 initial items were then reviewed by six additional content experts for screening for content relevance and alignment with our framework and measurement goals. Using Lynn's validity metric (Lynn, 1986), each item was examined by these experts, showing the degree of the content experts' agreement. 11 items were removed as the items did not reach the consensus criteria (0.83) (see Table 7). A total of 40 items were pretested by 10 college students. The students did not report any ambiguous or misleading items. The final CBLA items were shown in Appendix B.

Table 7. Construct validity index (CVI) ratings of each item

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Number in Agreement	CVI score
1	3	4	4	3	4	3	6	1.00
2	3	3	4	4	3	2	5	0.83
3	3	4	3	4	4	3	6	1.00
4	4	2	4	4	4	4	5	0.83
5	3	1	4	4	2	3	4	0.67
6	2	4	4	4	4	3	5	0.83
7	3	4	4	4	4	3	5	0.83
8	3	1	2	3	3	4	4	0.67
9	2	3	3	4	3	3	5	0.83
10	2	1	3	4	2	2	2	0.33
11	2	2	2	4	4	4	3	0.50
12	2	3	4	4	4	3	5	0.83
13	2	3	3	4	4	4	5	0.83
14	3	2	4	4	4	4	5	0.83
15	1	1	4	4	4	2	3	0.50
16	2	4	4	4	3	4	5	0.83
17	2	3	4	4	4	4	5	0.83
18	3	3	4	4	4	4	6	1.00
19	2	3	4	4	4	4	5	0.83
20	3	3	4	3	4	4	6	1.00
21	3	4	4	4	4	4	6	1.00
22	3	3	4	4	4	3	6	1.00
23	3	4	4	4	4	4	6	1.00
24	3	2	4	4	4	3	5	0.83
25	2	3	4	4	4	3	6	1.00
26	1	2	4	4	4	2	3	0.50
27	4	1	4	4	4	2	4	0.67
28	2	3	4	4	4	3	5	0.83
29	2	4	4	4	4	3	6	1.00
30	4	2	3	4	3	3	5	0.83
31	2	3	4	4	4	3	5	0.83
32	2	3	4	4	4	3	5	0.83
33	2	2	3	4	3	2	3	0.50
34	2	3	4	4	4	3	5	0.83
35	3	3	4	4	3	2	5	0.83
36	3	2	3	4	4	3	5	0.83
37	3	2	3	4	3	3	5	0.83
38	2	3	4	4	4	3	5	0.83
39	2	2	2	2	2	2	0	0.00
40	2	3	4	4	4	4	5	0.83
41	2	3	4	4	4	4	5	0.83
42	2	3	4	4	4	3	5	0.83
43	3	3	4	4	4	2	5	0.83
44	3	3	4	4	4	3	6	1.00
45	1	1	3	4	4	2	3	0.50
46	2	3	4	4	4	3	5	0.83
47	3	3	4	4	4	3	5	0.83
48	3	2	4	4	4	3	5	0.83
49	1	3	4	4	4	2	4	0.67
50	2	3	4	3	4	3	5	0.83
51	3	2	4	3	4	3	5	0.83

Note. Shaded items had CVI values less than 0.83, so they were excluded in the final version of assessment.

Rasch Analysis

Descriptive statistics

Table 8 illustrates descriptive statistics of the CBLA scores by items and demographic information. Particularly, this table includes the sample size and percent, minimum and maximum of total scores, mean scores, and standard deviation (SD). The total number of items was 40 and each item was worth 1 point. The mean of college basketball literacy among the participants was 28.55 with 9.39 SD. Two students scored 6 points, the minimum score, and 10 students scored 40 points, the maximum score. For subcategories, the assessment is composed of 23 Hands-on Knowledge items and 17 Context Knowledge items. The mean score of HAND-ON KNOWLEDGE was 16.57 out of 23 (72%) and the mean score of CONTEXT KNOWLEDGE was 11.98 out of 17 (70%), showing similar performance on subcategories items. Male students showed higher performance with a mean of 31.90 than female students who have a mean of 23.80. According to grade levels, graduate students showed the highest performance with 32.52 and the average of total score increases as the students' grade increases. The average scores by ethnicity varied across the groups where African American/non-Hispanic black group (28.29) showed the highest and American Indian or Alaska Native group scored lowest (19.83). Statistical analyses on group comparisons will be presented in the following section, using a common scale (logits).

Table 8. Demographic information and descriptive statistics

	N	Percent	Min.	Max.	Mean	SD
Item (0-40)						
Hands-on Knowledge	23		1	23	16.57	5.73
Rules (1-6)	6		0	6	4.51	1.57
Skills and Drills (7-10)	4		0	4	2.84	1.27
Strategy (11-18)	8		0	8	5.56	2.37
Terminology (36-40)	5		0	5	3.66	1.38
Context Knowledge	17		1	17	11.98	4.02
History and Culture (19-23)	5		0	5	3.73	1.43
Statistics (24-29)	6		0	6	4.36	1.48
Organizational Structure (30-35)	6		0	6	3.90	1.70
Total	40	100	6	40	28.55	9.39
Gender						
Male	224	58.6	8	40	31.90	8.11
Female	158	41.4	6	40	23.80	9.04
Total	382	100	6	40	28.55	9.38
Grade Level						
Freshman	130	34.0	8	40	26.05	9.22
Sophomore	79	20.7	6	40	26.91	10.10
Junior	78	20.4	8	40	29.78	9.14
Senior	59	15.4	9	40	32.20	8.09
Graduate	36	9.4	6	40	32.52	7.47
Total	382	100	6	40	28.55	9.39
Ethnicity						
African American/non-Hispanic black	38	9.9	8	38	28.29	10.13
American Indian or Alaska Native	6	1.6	9	36	19.83	12.12
Asian American/Pacific Islander	86	22.5	6	39	25.27	9.98
Caucasian/non-Hispanic white	189	49.5	9	40	31.09	7.88
Mexican American/Hispanic	51	13.4	7	40	26.22	9.57
Other	12	3.1	8	40	27.17	11.38
Total	382	100	6	40	28.55	9.39

Assumptions for the Rasch model

Unidimensionality. Prior to the main IRT analyses, the data's unidimensionality assumption was evaluated, using EFA, CFA, and IRT method (PCA residuals). Summary results of EFA, CFA, and PCA residuals assessing the unidimensionality hypothesis are shown in Table 8. The first factor from the EFA explained 31.14% of the variance and the ratio of the first two eigenvalues was 7.23. For the first factor, only item 37, "What is

the meaning of 'field goal'?", had a relatively low factor loading (0.266) out of 40 factor loadings in the CBLA. These findings suggest a single underlying dimension. The Scree plot (See Figure 5) supported the dominance of a one-dimensional solution.

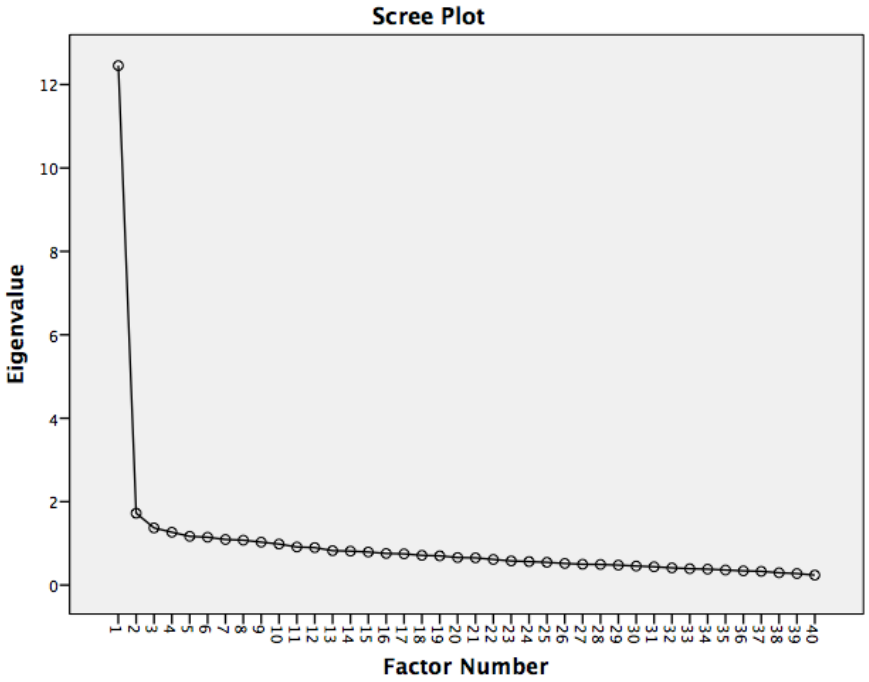

Figure 5. Scree plot of the CBLA

In CFA, several well established indices and criteria were used to assess the goodness of fit of a single-factor model. The chi-square statistics was used to evaluate a proposed model varied from the data and was statistically significant. However, because the chi-square value is sensitive to sample size (Healey, 2012), the normed chi-square value (χ^2/df) was also used in the study. This method controls the effect of the sample size that is usually recommended in CFA. The norm chi-square value was 1.189, indicating an excellent fit. Other fit indices, CFI = 0.989, TLI = 0.988, RMSEA = 0.022 with a 90% confidence interval between 0.016 and 0.028, and WRMR = 0.912 (see Table 9), indicate that the one-factor model fits the data well (Hu & Bentler, 1999; Kline,

2015). This result provides empirical evidence of the unidimensionality of the CBLA measure. Also, all factor loadings were significant ($p < 0.001$).

Additionally, principal component analysis (PCA) on standardized residuals provides diagnostic information to check unidimensionality of the family of Rasch models. A PCA on residuals from a unidimensional data set is expected to extract no principal components (Wright, 1996). The first dimension explains 62.0% of the variance in the data and the eigenvalue of the first contrast is 2.16. This value is somewhat bigger than the acceptable cutoff value (an eigenvalue of 2); however, the eigenvalue of 2.16 indicates random errors in the residuals and overall the CBLA can be treated as a unidimensional measure.

Local independence. When the local independence assumption is met, the responses to all items of a test are independent of one another. For the 40 items included in the analysis, there was a total of 780 *Q3* correlations. The mean of *Q3* correlations across 40 items was -0.024 with a standard deviation of 0.073. This value is very close to the target value of -0.026 for a 40-item test (= -1/(n-1) where n = 40). This result suggests that the items were locally independent enough to carry out Rasch analysis.

Table 9. Fit index for the unidimensionality assumption

	CBLA
EFA	
% of variance explained by first factor	31.14%
Eigenvalue ratio of first factor to second factor	7.23
Number of first factor loading > 0.30	39/40
CFA	
χ^2	879.893 (df = 740, p = 0.0003)
Normed χ^2 (χ^2/df)	1.189
CFI	0.989
TLI	0.988
RMSEA (90% CI)	0.022 (0.016: 0.028)
WRMR	0.912

Model-data fit

In the initial analysis, one item was flagged due to a high Infit statistic. Item 37 (What is the meaning of "field goal"?) had an Infit value of 1.60, indicating that this item was determined to be weakly correlated to the overall construct. All Infit statistics of remaining 39 items ranged from 0.73 to 1.43, indicating that all 39-item scores were within the acceptable range between 0.5 and 1.5. This finding indicates that the 39 CBLA items well represent the construct that the assessment was intended to measure (i.e., college basketball literacy). The Outfit statistics ranged from 0.34 to 1.86, indicating that there were few misfit items in this assessment. Four items (Item 10, Item 28, Item 30, and Item 14) had high Outfit values above 1.5 while two items (Item 19 and Item 24) had low Outfit values less than 0.5. After screening all responses across the misfit items, these misfits were determined to be the result of random responses by low performers or lucky guesses and careless mistakes by participants.

Facet map

Figure 6 presents the facet map constructed for the CBLA. The students with their literacy, subcategories of literacy components, and test items are plotted, using the Rasch measure (logit scale). These measures are linear measures where the three categories above are displayed along the unidimensional logit scale. The distribution of students' college basketball literacy levels is displayed on the left side of the map indicated by "*s" and ".s". The distribution of the CBLA subcategories is located in the middle of the map. The distribution of the CBLA items is placed on the right side of the map based on their level of difficulty, for example, as indicated by I1 for Item 1. Lower person measures, subcategory difficulties and item difficulties are illustrated at the base of the map, while higher performing students and more difficult subscale with items are presented at the top of the map. The figure shows that the students' college basketball literacy levels were

widely distributed along the logit scale; however, the items within the subcategories were slightly skewed toward students with moderate to low levels of literacy, and did not provide content coverage for students' who had higher levels of literacy (> 2 logits). This indicates that students with higher levels of literacy were measured less precisely, suggesting that the current assessment will detect a greater separation between students' abilities by including more difficult items to fill the measurement gaps.

The facet map also provides additional information for potential improvement and/or development of the assessment. As seen in the item distribution, there are several items measuring students around the same logit scale (i.e., items that have same item difficulty) that can be excluded from the assessment without a significant loss of content information when a short version of the assessment is considered. For example, seven items (i.e., Item 1, 10, 13, 16, 18, 22, and 40) appear to measure students at a similar location on the logit scale so that these items can be pruned for the modified version of the assessment. Reversely, more items can be added to the assessment when developing a larger item pool for reducing potential bias for taking this assessment. In other words, if there are items that have similar difficulties in the item pool, then the evaluators will have more chance to select items to reduce test-retest bias.

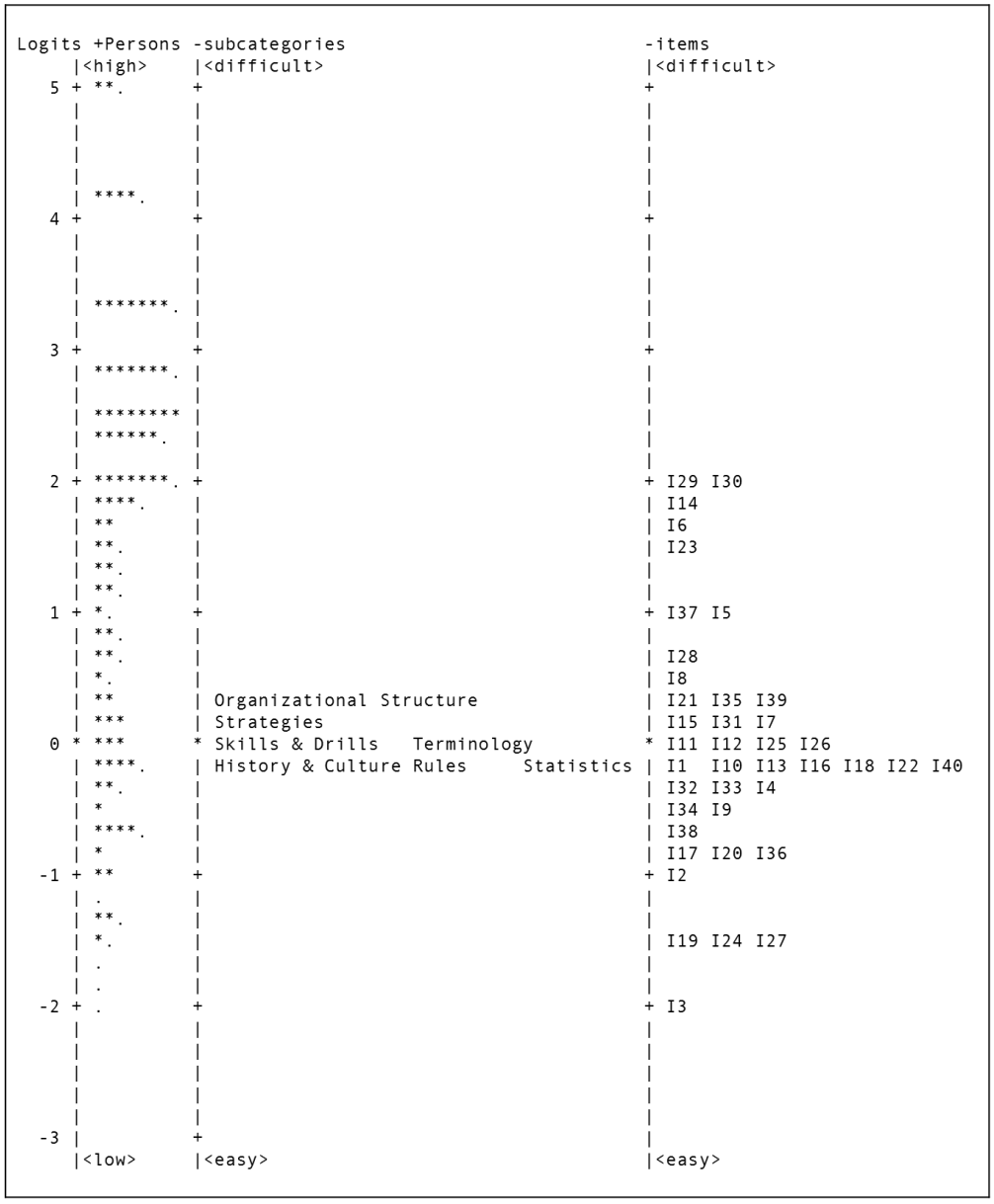

Figure 6. Facet map of the CBLA

Note. Each "*" represents 4 participants while "." Indicates a single participant.

A unique aspect in Rasch analysis is category comparisons in the facet map. As the persons and items are expressed in the same unit, the map provides useful interpretations. For example, if a logit score of student's literacy is the same as the item difficulty, the student has a 50 percent chance of correctly answer that item (e.g., a

student with 1 logit score can correct the item 37 and 5 by 50 percent. This also indicates that if students are located above the item difficulty, then they have a higher chance of correct that items and vice versa.

Item difficulty of the CBLA

Table 10 shows the CBLA item difficulty, standard errors, and Infit and Outfit statistics. The correct responses on items were coded as 1 and incorrect responses on items were coded as 0. The items with a lower total score are more difficult items and those with a higher score are easier items. Correspondingly, the higher logit score items are more difficult items that students to have lower chance to correct that item. The lower logit score items are easier items. The CBLA item difficulties ranged from -2.07 to 1.96 logits. The three most difficult items (i.e., the items that have less correctness) were "How many teams are in the men's NCAA Tournament? (Item 30)", "What is another way of saying 'the amount of points and assists that a player accumulates for their team'? (Item 29)", and "What type of offense could best spread out a man-to-man defense? (Item 14)". The three least difficult items (i.e., the item that has higher correctness) were "What is a general meaning of the term "flagrant foul"? (Item 3)", "What is the meaning of PER? (Item 27)", and "What does PPG stand for? (Item 24)". Item separation of 6.32, which exceeds the criteria of 1.5 (Tennant & Conaghan ,2007), indicates the CBLA items had shown good variability. Item separation-reliability of 0.98 provided evidence that these items are large enough to precisely locate the items on the latent construct within measurement error for another sample.

Table 10. Summary of Rasch calibration of the CBLA items

Item	Total Score	Calibration Logits	SE Logits	Infit MnSq	Outfit MnSq
Item 30	145	2.24	0.13	1.18	1.56
Item 14	161	1.98	0.13	1.27	1.48
Item 29	169	1.85	0.13	1.24	1.39
Item 6	191	1.50	0.13	1.03	1.01
Item 23	199	1.37	0.13	0.98	0.94
Item 37	222	0.99	0.13	1.60	1.95
Item 5	236	0.76	0.13	0.97	0.94
Item 8	244	0.62	0.13	0.94	0.82
Item 35	244	0.62	0.13	1.28	1.23
Item 28	246	0.58	0.13	1.40	1.65
Item 31	257	0.39	0.13	0.85	0.71
Item 15	262	0.30	0.14	0.77	0.65
Item 7	263	0.28	0.14	0.86	0.68
Item 39	266	0.22	0.14	0.92	0.79
Item 1	270	0.15	0.14	0.84	0.64
Item 11	275	0.05	0.14	1.02	1.00
Item 12	276	0.03	0.14	1.16	1.20
Item 13	277	0.01	0.14	0.87	0.76
Item 32	277	0.01	0.14	1.19	1.36
Item 18	278	-0.01	0.14	0.73	0.51
Item 10	279	-0.02	0.14	1.31	1.75
Item 25	279	-0.02	0.14	0.78	0.64
Item 33	279	-0.02	0.14	1.29	1.28
Item 16	281	-0.06	0.14	0.76	0.53
Item 26	283	-0.10	0.14	1.02	1.09
Item 40	285	-0.14	0.14	1.04	1.08
Item 34	287	-0.18	0.14	0.83	0.66
Item 22	291	-0.27	0.14	1.04	0.90
Item 1	298	-0.41	0.15	0.90	0.77
Item 9	299	-0.44	0.15	0.99	0.92
Item 4	307	-0.61	0.15	0.90	0.58
Item 38	309	-0.66	0.15	0.89	0.72
Item 17	314	-0.78	0.16	0.81	0.49
Item 36	317	-0.85	0.16	0.86	0.50
Item 20	319	-0.90	0.16	0.87	0.65
Item 2	330	-1.20	0.17	1.03	0.88
Item 24	344	-1.64	0.19	0.82	0.38
Item 27	344	-1.64	0.19	0.90	0.53
Item 19	345	-1.68	0.19	0.77	0.34
Item 3	359	-2.28	0.23	0.93	0.42

Note. SE = standard error, MnSq = mean square residual.

Subcategory difficulty of the CBLA

The CBLA subcategory difficulties, standard errors, and Infit and Outfit statistics are demonstrated in Table 11. The subcategory with the higher logit measures indicates that the group of items for a subcategory is harder to correctly answer by examinees. The Infit and Outfit statistics of all subcategories ranged from 0.69 to 1.13, indicating an appropriate fit close to 1. The most difficult subcategory was ORGANIZATIONAL STRUCTURE (logits = 0.28) and the easiest subcategory was RULES (logits = -0.21). The subcategory separation was 2.53, exceeding the criteria of 2.0, shows acceptable variability. Also, the subcategory separation-reliability was 0.87, indicating that these subcategories have higher confidence in relocating the categories for another sample.

Table 11. Summary of Rasch calibration of college basketball literacy subcategory

Subcategory	Calibration Logits	SE Logits	Infit MnSq	Outfit MnSq
Organizational Structure	0.28	0.06	1.11	1.13
Strategy	0.11	0.05	0.93	0.83
Skills & Drills	0.07	0.07	1.02	1.04
Statistics	-0.03	0.06	1.09	1.01
Terminology	-0.08	0.06	1.07	0.95
History & Culture	-0.14	0.07	0.92	0.69
Rules	-0.21	0.06	0.96	0.96

Note. SE = standard error; MnSq = mean square residual.

Individual and group levels of college basketball literacy

The students' college basketball literacy level was expressed using a linear logit scale. It is ranged from a low of -2.03 to a high of 5.36. Table 12 provides a scoring sheet which converts the raw CBLA scores (i.e., summed scores) into logit scores. A high logit value indicates a higher level of literacy in which the students' literacy had extensive variation in levels. The average level of students' college basketball literacy was 1.48 (SD = 1.65). A person separation index of 2.55 represents a good level of separation,

indicating that the students' literacy level varied moderately along the logit scale from measurement perspective. The person separation-reliability was 0.87, an acceptable internal consistency that the items assess the same construct yielding similar scores across groups.

Table 12. Rasch logit conversion values for the CBLA total scores

CBL Total Score	Measure in Logits	CBL Total Score	Measure in Logits
6	-2.03	24	0.48
7	-1.82	25	0.60
8	-1.63	26	0.73
9	-1.46	27	0.86
10	-1.30	28	1.00
11	-1.15	29	1.14
12	-1.01	30	1.30
13	-0.87	31	1.46
14	-0.74	32	1.63
15	-0.61	33	1.82
16	-0.49	34	2.03
17	-0.36	35	2.27
18	-0.24	36	2.55
19	-0.12	37	2.90
20	-0.01	38	3.36
21	0.11	39	4.11
22	0.23	40	5.36
23	0.35		

Note. CBL = College Basketball Literacy; CBL Total Score = sum of correct items; Measure in Logits = MnSq of each item.

College basketball literacy by the grade levels. A one-way analysis of variance (ANOVA) test was conducted to examine the mean difference in CBLA scores across grade levels. Table 13 displays the descriptive statistics (number of students, mean, SD, Minimum, and Maximum) by each group. The assumption of homogeneity of variances met the criteria ($p > 0.106$). As the normality test results showed that the data were not normally distributed in that the study specifically used a Kruskal-Wallis H test (a nonparametric one-way analysis of variance). The Kruskal-Wallis H test showed that

there was a statistically significant difference in the CBLA scores between the different grade levels, $\chi^2(4) = 31.772$, $p < 0.001$, with a mean CBLA score of 0.99 for freshmen, 1.26 for sophomores, 1.63 for juniors, 2.19 for seniors, and 2.17 for graduate students. In order to examine between-groups comparisons, the Mann-Whitney test with Bonferroni correction was used to employ multiple comparisons. To perform a Bonferroni correction, the critical *p*-value (α) of 0.05 was divided by 10 as the study examined 10 hypotheses. The results showed that there is a significant difference in CBLA scores in which juniors ($U = 3841.5$, $p = 0.003$), seniors ($U = 2223$, $p < 0.001$), and graduate students ($U = 1299$, $p < 0.001$) had higher mean scores than freshmen. The results also indicate that seniors had a higher mean score than sophomores ($U = 1643$, $p = 0.003$).

Table 13. Descriptive statistics for grade levels

Grade	N	Mean (θ)	SD (θ)	Min. (θ)	Max. (θ)
Freshman	130	0.99	1.48	-1.63	5.36
Sophomore	79	1.26	1.79	-2.03	5.36
Junior	78	1.63	1.56	-1.63	5.36
Senior	59	2.19	1.61	-1.46	5.36
Graduate	36	2.17	1.51	-2.03	5.36
Total	382	1.48	1.65	-2.03	5.36

College basketball literacy by gender. In order to compare the college basketball literacy of male students and that of female students and the Mann-Whitney test was conducted to examine a mean difference between two groups. The results show that there is a significant difference in the mean scores of CBLA between the two groups), $U = 8387$ ($p < 0.001$), indicating the mean of male students was higher than female students. Descriptive statistics for gender were provided in Table 14 below.

Table 14. Descriptive statistics for gender

Gender	N	Mean (θ)	SD (θ)	Min. (θ)	Max. (θ)
Male	224	2.09	1.55	5.36	-1.63
Female	158	0.61	1.37	5.36	-2.03
Total	382	1.48	1.65	5.36	-2.03

College basketball literacy by basketball experience. The Pearson correlations were examined between the length of basketball experience: spectating years and the CBS scores ($r = 0.612, p < 0.001$) and participation years, and the CBLA scores ($r = 0.616, p < 0.001$). Also, the correlation between spectating and participation in basketball was statistically significant ($r = 0.530, p < 0.001$). These results show the predictive validity evidence of the CBLA. In order to compare the CBLA scores of means by basketball experience, the students were split into four groups: (1) SP group (students who only watched college basketball and played basketball; (2) OS group (students who only watched college basketball but not played basketball; (3) OP group (students who ever played basketball but not watched basketball); and (4) NSP group (students who do not have watched college basketball and played basketball. The descriptive statistics of the four groups are displayed in Table 15 below.

Table 15. Descriptive statistics for basketball experience

Group	N	Mean (θ)	SD (θ)	Min. (θ)	Max. (θ)
SP group	283	1.92	1.54	5.36	-1.63
OS group	58	0.60	1.29	3.36	-2.03
OP group	31	-0.35	1.00	2.27	-2.03
NSP group	10	-0.51	0.55	0.48	-1.30
Total	382	1.48	1.65	5.36	-2.03

The Kruskal-Wallis H test results showed that there was a statistical difference among the four groups, $\chi^2(3) = 89.458$, $p < 0.001$. The Mann-Whitney test with Bonferroni was carried out to identify the contrasts between groups. The results indicate that the SP group had a higher value than the OS group, OP group, and NSP group at alpha level 0.001 ($U = 4190$, 1053, and 250, respectively). In addition, the study found that the CBL scores of the OS group were significantly higher than those of the OP group ($U = 502.5$, $p = 0.001$) and NSP group ($U = 126.5$, $p = 0.005$). However, no significant difference was found between the OP group and NSP group.

Differential item functioning (DIF)

This study also examined the CBLA to see whether the assessment items have any group bias. DIF analysis was performed for gender and test groups (UT students and non-UT students). All 40 items did not show any gender bias (unexpected difference) in the item difficulty, indicating that male and female students who had similar literacy have similar performance. For affiliates, 251 UT students and 131 non-UT students, one item (Item 23: Who was the player that hit a game-winning turnaround jump shot against Kentucky in the 1992 NCAA Tournament?) was flagged based on the evaluation criteria (Zwick et al., 1999). The Mantel-Haenszel (M-H) DIF size of this item was 14.95 (> 0.64 logits) and it is statistically significant ($p < 0.001$). This indicates that the item's level of difficulty varied by test groups. More specifically, UT students found item 5 less difficult than non-UT students, M-H DIF size = 0.97. This result informs us that item 5, "What do you have when a defensive player attempts to take a charge with his feet inside the semi-circle of the "paint" area?" can be potentially removed from the measure.

Difference between the CBLA and self-report college basketball knowledge

In addition to the main study, the study compared students' scores from the CBLA with their self-report scores to identify the gaps between two different approaches in measuring college basketball literacy. Figure 7 displays students' self-report on college basketball knowledge and their actual literacy derived from the CBLA. X-axis presents self-reported scores of students from "not at all" to "extremely knowledgeable" in 5-point Likert scale. Y-axis is their matched scores in logit scale. The figure shows that there is a large gap in literacy levels between self-reports and the CBLA scores. Although there was a significant correlation between those two measures ($r = 0.623$, $p < 0.001$), the figure shows the measurement gaps due to the type of assessment. For example, some

scores of self-report did not match with the score in the CBLA scores and these gaps are consistently shown for all levels of literacy.

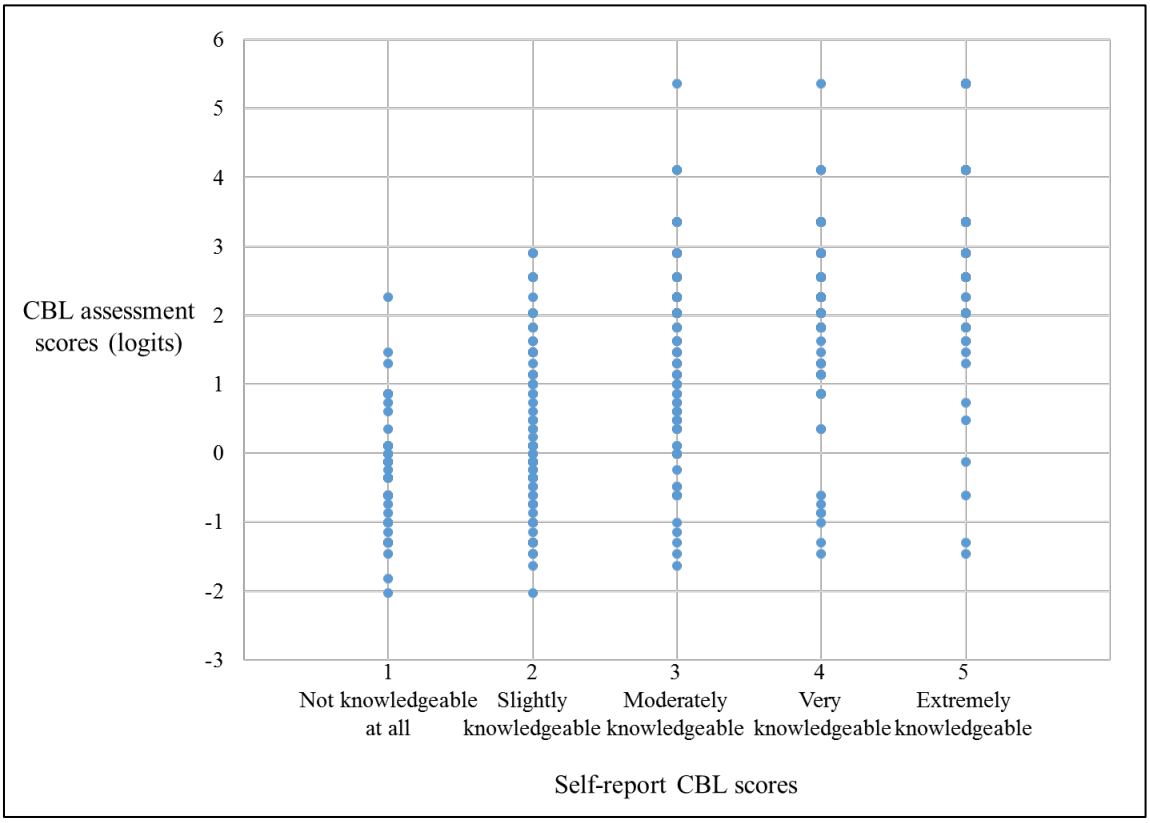

Figure 7. The gaps between the CBLA and self-report scores

DISCUSSION

The purpose of this study was to develop a psychometrically sound assessment of college students' college basketball literacy. Following Myslevy's guideline, 40 items were developed throughout the instrumentation process. The study used Rasch analysis to calibrate the CBLA items providing evidence for the psychometric properties of the assessment. In fact, the results of this analysis offer distinctive suggestions for the development of sport literacy assessment.

First, this study demonstrates that the CBLA has construct validity. Overall, Infit and Outfit statistics of Rasch analysis were in an acceptable range. These results support the use of CBLA to assess college basketball literacy among students based on their ability to solve the literacy items. One item (Item 37; What is the meaning of "field goal"?) has a slightly high Infit statistic (1.60) than the statistical criterion (1.50). This indicates that the ability to comprehend the term "field goal" may weakly correlate with the overall construct. Although this item was identified as a statistically misfit item, I decided to include this item within the CBLA. Because, theoretically, comprehending one of the basic terminology "field goal" is related to terminology and statistics as well. By assessing this ability, we can have a better understanding on students' literacy level. On the other hand, the results identified six misfit items regarding Outfit statistics. Outfit statistics provides information about outliers or noise within the responses. Four items were high outfit items that had a few random responses by low performers. For example, one could correctly answer an item even if he/she does not have an ability to solve that item. The misfit items, in descending order, were "Which parts of the setting a screen are necessary to complete a legal screen?" (Item 10), "If team X beats team Y by shooting 55% from the field and allowing 40% shooting, what deductions can reasonably be made about this game?" (Item 28), "How many teams are in the men's NCAA Tournament?" (Item 30), and "What type of offense could best spread out a man-to-man defense?" (Item 14). These items have relatively high difficulties across all the items (Item 10 (-0.02), Item 28 (0.58), Item 30 (2.24), and Item 14 (1.98)), and it might be difficult for less literate students to correctly answer them. However, these four items showed that there were some responses that correctly answered them by less literate students. This guessing factor can be identified through an advanced IRT model (three-parameter logistic model) (Lord, 1980). This model requires at least 1,000 responses to estimate the factor that will

be recommended for future studies. On the other hand, two items have low Outfits which indicate careless mistakes by students. The items were "How does a university team generally get their basketball players? and "What does PPG stand for?". These items are easy items that can be easily/correctly answered by students who have a high level of literacy. However, the results indicate that there were few unexpected responses in these items. From the screened data, three high performers incorrectly answered these items. As these items were identified as the second and fourth easiest items, it can be inferred that these results might be coming from careless student responses.

Second, the results of this study provide useful information for the potential improvement of the assessment. Facet map shows relative positions of students' literacy and item difficulty. This allows us to understand the relationship between them. For example, if a student's person score is higher than an item difficulty, we can predict that a student has more than a 50% chance to correctly answer that item. Likewise, if a student's person score is lower than the item difficulty, that student is predicted to incorrectly answer that particular item by 50%. This is somewhat useful when we briefly screen the students' literacy with a few items that represents cut off points. The Facet map also provides where we can add or remove items to improve the scale. As shown in Figure 6, the distribution of students' literacy scores was slightly skewed towards high literacy levels. However, the item coverage was relatively narrow enough to differentiate those high literate students. One possible explanation for this limitation is due to the lack of difficult items. This does not degrade the validity of the assessment but can possibly affect the accuracy of measuring high levels of literacy. To increase the accuracy of the measurement, adding more difficult items is recommended in the CBLA. This process should follow the framework proposed in this study. In addition to the item coverage issue, the results show that the CBLA can potentially be shortened by removing several

items. If the items were in the same difficulty level, we can conclude that they are functioning similarly in terms of measurement. However, we should also consider the balance of each subcategory when removing the items. According to Boone et al. (2014), at least two items are required to represent a certain subcategory across certain levels of difficulty. This also means if there was only one item on a certain item difficulty, it is recommended to add one or more similar difficult items to improve the accuracy. When considering the difficulty of the items, subcategory section in the Facet map can also be useful. This map aggregates the items of each subcategory by its difficulty. If the selected items of the assessment are skewed to a certain subcategory, then this may be degraded to content the validity of the scale. Thus, when adding or removing items, many-facet analysis should be conducted to assess how the items were distributed within the subcategory levels.

In addition to the assessment development suggestions, inferential statistics were provided in this study. The study compares the mean scores by gender, grade levels, and basketball experience (see Figure 8). These results may help sport managers understand which group has higher or lower literacy. For example, the current study identified male students having higher literacy than female students. This finding is consistent with other study results that reported the gender difference regarding perceived knowledge in sports (Davis & Duncan, 2006; Lee et al., 2011). One possible explanation would be the lengths of sport experience. Although there are similar portions of male and female students who watched or played basketball, the average lengths of spectating (7.83) and participation (8.28) years of male students were longer than those of females (4.77 and 4.21 respectively). This will be interesting information regarding fan recruitment and retention. We can assume that male students were exposed to earlier in college basketball and are more likely to be subjected in longer retentions in comparison to female students.

The results of group comparison by grade levels provide somewhat interesting viewpoints. According to the data, students' literacy increases by grade levels. This implies that students have developed their literacy through the progression of their college years. This can be explained by a social constructivist perspective. It describes that learning sport is the outcome of social and cultural context where students are situated (Bandura, 2002; Dyson, Griffin, & Hastie, 2004; Kirk & Kinchin, 2003). This implies that sport managers should be recognizing the importance of the location that sport games occur and how to effectively deliver essential knowledge and information to their spectators.

The averages of basketball experience support these results, where higher grade level and more experience tend to convert to higher literacy levels. Then, what kind of experience would be considered as aiding to one's literacy? The results of group comparisons provide possible explanations. The group of students who have both watched and played basketball (SP) was the highest, with only watched group (OS), only participated group (OP), and no experience (NSP) following in respective order. Interestingly, the study found that literacy is more related to the spectating experience. The averages of literacy scores were significantly higher in two groups (SP and OS) than the others. This may be due to the fact that the CBLA contains context knowledge which describes the background knowledge that comes from the spectating experience. Notably, the group of both spectating and participating had the highest literacy, meaning that higher literacy would more likely be reached by the students who have both watched and played the sport.

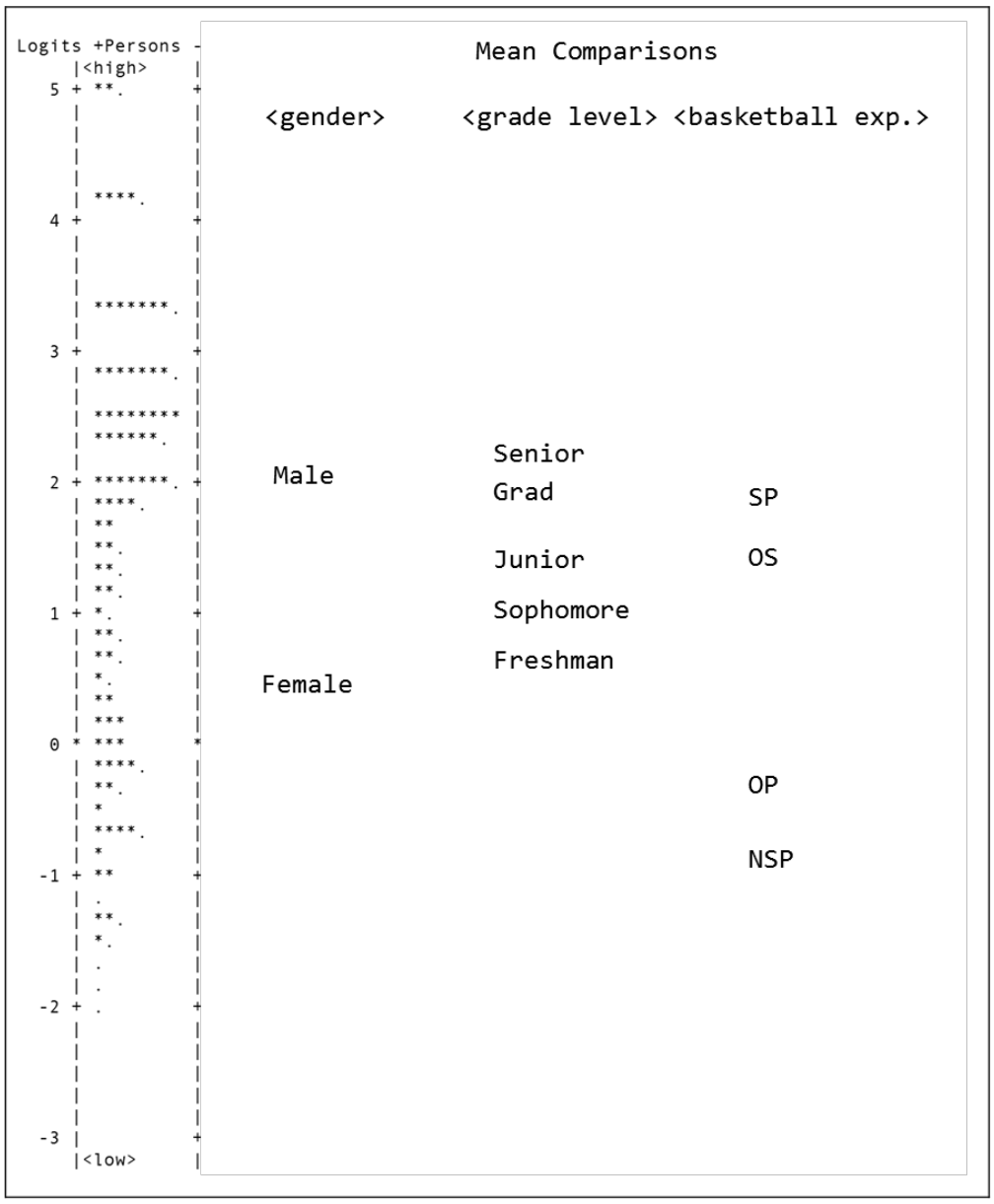

Figure 8. The average CBLA scores by gender, grade level, and basketball experience

This study further explored the relationship between the students' literacy and likelihood of students' intention to watch or attend the college basketball games next season. The results demonstrated that there was a significant relationship between literacy and intention to watch the game ($r = 0.458$, $p < 0.01$). Also, the study examined the relationship between team identification level and spectating intention which has been

considered to be as important in fan development (Ahn et al., 2012; Matsuoka, Chelladurai, & Harada, 2003). They are also significantly correlated ($r = 0.540, p < 0.01$). These results offer stark evidence of the importance of being literate in sport as a critical factor in understanding the sport consumer behaviors, like fanship. To increase the number of spectators, there need to be more literate individuals. On the other hand, the relationship between literacy and team identification was also significant ($r = 0.382, p < 0.01$). Some sport psychologists have argued that one who has highly identified with his/her team may have a higher chance to search information about their team, players, etc. than those who have no connections whatsoever (Wann & Branscombe, 1995). This may lead to an increase of his/her level of literacy in sport. From the affective-cognitive theory, we can hypothesize that an increase in one's sport literacy can strengthen the level of interest, involvement, and even fanship. Although this study did not provide the function of literacy on those affective domains, sport managers can take steps to incorporate this information into their analysis and programing.

LIMITATIONS

Potential limitations to this study include non-probability sampling, assessment coverage, and assessment format. First, the sampling strategy adopted in this study should be considered for the generalizability of the results. This initial validation was conducted through convenience sampling. Although the demographic distributions were reasonably representing the university setting, they do not represent the average universal college students. For example, the data were collected from two universities that belong to the NCAA division I. These students were predictively more exposed to college basketball than those who attend a lesser division school. Also, since the randomization was not in place with the college students, the person scores were not normally

distributed. Thus, the interpretation of representativeness should be restricted. Although this study had over 300 samples which requires for Rasch analysis, collecting more sample is recommended to achieve more robust analyses. Given the results, there were several items that have shown misfit on Outfit statistics. Most of these results were from unexpected responses. This issue can be adjusted through the 3-PL IRT model. In addition to the sampling, the assessment coverage in this study can be potentially improved. As shown in the Facet map, there was a lack of difficult items that can accurately measure high-level literacy students. By undertaking similar steps described in this study of item development process, the assessment would increase the accuracy. Potentially, a larger item pool with diverse difficulties is required to more accurately examine the literacy. Also, this will reduce the chance of producing test-retest bias or bias from specific knowledge that students may possess. Lastly, while this study explores the unique aspect of Rasch analysis, since the item format is a multiple choice format, the literacy was not able to capture their partial knowledge or ability to describe their actual understanding. Masters (1982)'s partial credit model would minimize this limitation. In the future, an experimental study using partial credit model, which utilizes open-ended questions, will be applied to address this concern.

Chapter 5: Integrated Discussion

Recruiting and retaining spectators is one of the most important issues for sport managers to sustain and develop their sport system. Understanding the literacy of consumers within a given sport is essential in designing effective marketing and advertising campaigns for sport events and games. The two sequential studies presented in this dissertation made an initial attempt to develop an analytical framework measuring sport literacy among college students. The first study provides empirical evidence which supports a conceptual framework of sport literacy using college basketball as a case. The results demonstrated that sport literacy is comprised of both hands-on knowledge and context knowledge. Moreover, the concept of literacy should be understood on a broader level. Thus, the study suggests a developmental process adapting Bloom's (1956) traditional learning model to offer an analytical framework. Expanding sport management research to sport education as an essential aspect of this dissertation may increase spectatorship for a given sport. This has potential to yield meaningful insights for sport managers in identifying the relationship between literacy and consumer behaviors. Specifically, the findings of this research suggest that increases in literacy may enhance spectators' interest through appreciation of the game. With increased interest offering hope for an individual to be more involved with given sport, a sustaining model can be potentially created. The essential question for sport managers becomes "How much literacy is needed for spectators to predict their behaviors?" To address this issue, a second study was conducted to provide a tentative assessment tool for college basketball. In the second study, 40 items regarding men's college basketball literacy was developed and calibrated. The study used a relatively advanced technique in instrumentation. This allowed for a more accurate examination of the psychometric properties of the

assessment. Most studies do not provide validity within their processes or frameworks, while this dissertation provides construct validity including a detailed description of the IRT analysis process and its findings. The results also support internal structures which demonstrates that the CBLA had acceptable reliability. The strength of this dissertation flows from a robust procedure in instrumentation.

The sport literacy model presented in this dissertation was founded on the basis that knowledge and literacy develop through increased interest and active engagement. Given the nature of the data, however, the study is limited in explaining how exactly knowledge and literacy develop particularly beyond school participation and viewership. One can develop his or her sport experience through video gaming, informal sport, or even socializing over sport. All these activities are great sources in increasing an individual's literacy directly and indirectly. For example, fantasy sport participation increases one knowledge about a team, player, or even understand the mechanism of the game and how the sport works in reality (Halverson & Halverson, 2008). Learning both hands-on knowledge and context knowledge may lead individuals in becoming more literate. In a similar context, video gaming also helps increase one's literacy. Video Gaming has steadily become an attractive industry in regards to spectatorship and literacy. Amazon bought Twitch, a video game streaming app, for over $970 million dollars back in 2014 (Weinberger, 2016). The significance of this purchase is that Amazon sees the potential in the growing market of people just watching video games and not playing. Also, recently investors and sport teams have been investing and acquiring e-sports (Electronic Sports) teams. People like Magic Johnson has invested heavily into an e-sports team named Team Liquid. Sport teams such as the Golden State Warriors and the 76ers have actually bought e-sports teams for themselves (Rovell, 2016; Volk, 2016). These kinds of massive investments show that there is increasing interests in

e-sports and videogames, but applying this literacy model will be interesting findings, since there is a phenomenon of people just watching videogames rather than playing. Another interesting thing to look at is the reasoning behind all these investments and acquisitions. Investors and sport organizations have figured out that e-sports fans have a high tendency to purchase team products, like jerseys, keyboards, mouse, headphones, etc., in comparison to regular sport fans. Having an e-sports team is a huge source of revenue for anyone, and it seems like everyone wants a bit of the pie nowadays. This could be explained by the high correlation between literacy and fanship that was proposed in the dissertation, but further research will need to be done to make a sound statement. Bowers (2013) provides another perspective that informal sport can be a possible solution for improving one's literacy. Not forcing any regulations but letting the children learn about the sport in a more natural manner. It seems ideal that people should develop literacy through multiple ways but it still remains as a question on how sport managers can deal with this issue within a given context.

In a theoretical perspective, empirical evidence suggests that sport literacy can be used as an independent construct anticipating sport spectator behaviors. Although the study did not test about theoretical models regarding the dynamics of spectatorship, simple correlations between sport literacy and some key variables (team identification, spectating intention) showed some possible insights that sport literacy can be a useful indicator for understanding spectators. For example, the CBLA could be used to develop a financial model that shows an accurate forecast of the correlation between sport literacy and consumer buying behaviors. Another application could be the development of a model that forecasts the correlation between sport literacy and frequency of attendance to sporting events and games.

The results of dissertation suggest further exploring the impact of the social environment on developing literacy. As seen from the interviews, novices generate inquiries as they face new situations or scenes that stimulate their sport experiences. They generally develop their literacy from accompanies or sources from devices to understand where they are situated. We can utilize Everett Roger's Diffusion of Innovation model to have a better understanding on how literacy spreads among people and the rate it spreads (Roger, 1995). Roger's has proposed that there are 5 key steps for anyone to fully understand and adopt an idea or product, and it is the ease and simplicity of each step that aids in the rapid spread of that idea or product. The 5 steps are: 1) Awareness (the person needs to be aware that an idea or product even exists), 2) Interest (the person needs to have an interest or they will not care about the idea or product), 3) Evaluation (the person needs to evaluate whether or not the idea or product is good for them and is worth their time and resource), 4) Trial (the person needs to try or learn more about the idea or product), 5) Adoption (the person is fully convinced with the idea or product and adopts it). Rogers has also stated that people can be categorized into 5 types of learners: Innovators (those who like to learn or try the brand new thing), Early Adopters (those who like to be ahead of the curve), Early Majority (those who like to go with the flow/trend), Late Majority (those who see the clear benefits of the product after everyone has used it and adopts it), Laggards (those who refuse to accept the idea or product until they have no choice). So in order for literacy to spread efficiently and at a rapid pace, we need to target the Innovators (those who like to learn about new things), and make the learning/adoption process as simple as possible. So, it will be an interesting experiment to see how literacy diffuses in a room full of both experts and novices.

From a practical standpoint, this study can be used as a guide to develop assessments for any other sport. Using this study's framework as a basis, it is possible to

develop assessments for sports that have a large college fan base such as football, or even up and coming collegiate activities that have similar aspects of gameplay as basketball. In addition, by identifying which knowledge components were lack in spectators, practitioners can effectively design their sport programs and educational materials depending on their level of literacy. This is an overarching theme of this dissertation, particularly when approached within an education perspective in sport management research.

Sport managers also can use this information to develop fanship among individuals. Does literacy affect the level of fanship? More specifically, what dimension would affect the level of fanship? A multiple linear regression was conducted to predict fanship based on their level of content knowledge/hands-on knowledge, gender, years in spectating/participation, and grade level. A significant regression equation was found ($F(6, 375) = 14.787$, $p < 0.000$), with an R^2 of 14.787. Among the factors, the scores of hands-on knowledge, years in spectating college basketball, and grade level were significant predictors of fanship: students' fanship increased 1.2 point for each point of hands-on knowledge score, 0.2 points for each of the years in spectating, and decreased 0.79 points for each grade level. This provides several implications that college basketball managers should notice for their fan development. First, hands-on knowledge was identified as a key literacy component for increasing fanship. It can be inferred that fans deepen their fanship as they understand more about what's going on in the game. This result is supported by the findings from the study 1 that experts are more engaged with the game as they are focused on each one of the plays, strategies, and etc. And this will possibly increase their interests and fanship for their teams. Second, the years in spectating may be another important factor that sport managers should consider. The longer students are watching basketball games the higher fanship. As discussed in

previous chapters, the continuation of literacy development may be a possible explanation for this relationship. Lastly, the study identified that students' level of fanship decreased as their grade level increased. For the selected sample from the current study, students may have relatively higher fanship with their teams when they entered the university. However, the teams in their college do not have a chance to appeal to the students in order to grow their fanship. As shown in the previous chapter, literacy and fanship have a positive correlation, intercollegiate managers should consider how to improve their students becoming literate in college basketball.

In summary, combining an understanding of the literacy domains and its subcategories guides the development of an individual's sport literacy, it becomes easier to comprehend the necessary elements that people should be equipped with in order to guide the sport managers. However, threading these knowledge components to an educational curriculum is very hard, especially in inducing people who are not interested in sports to begin with. To develop spectators, we first need to understand how literate the spectators are and create programs and curriculum to provide necessary knowledge. This dissertation presents the logical steps in which the researcher and practitioners can apply within a field of study. It is important to note that this study has used college basketball as its case, and that the model framework that was developed can be applied to other sports in circumstantial situations or with further refinement and adaptation. Sport literacy has been an aspect of sports that several practitioners and researchers largely overlooked, and with sparse research being done, several more research and case studies will need to be conducted in order to validate and strengthen its legitimacy. But, overall, it is of my belief that this is the foundation of sports and that literacy can serve as a basis for developing both practitioners and spectators of any sport.

SIGNIFICANCE OF THE STUDY

This dissertation makes several contributions in both academia and the field of sport management. First, the dissertation provides a new theoretical concept to the development of sport spectating literature. While the affective dimension of spectators has been studied in considerable depth, the cognitive aspects of understanding the necessary components for spectating have not been explored/identified. As the affective and cognitive cycle run interactively, it is necessary to identify knowledge components and the required level of understanding in sport spectating in order to provide and aid to managers who want to learn how they can keep their spectators engaged in their sport. This study provides empirical evidence to sport managers to proactively approach to their spectators through education and information providing. Practically, the development of this framework will help create educational materials, information on advertising, etc. Sport literacy also can be used as an outcome measure of sport spectating in designing consumers' spectating experiences when they reach a cognitive level that induces them to become more literate individuals.

Second, there are strong implications from the study that can help determine literacy assessment practices for sport researchers and/or managers. An example of this is how sport researchers use core knowledge frameworks in order to assess their market potential with regard to a reciprocal trade of knowledge so that it becomes a 'win-win' situation for everyone involved. Moreover, it would be beneficial not only for already popular sports but also for unpopular sports which need to promote themselves and increase the level of literacy of their potential spectator market. However, the effectiveness of this potential benefit may enable researcher to further analyze the improvement of cognitive levels correlating with increases in interest in actual sport settings. In this sense, this study provides a foundation for identifying the relationships

between knowledge and interest, which has already been proven in educational literature. Also, it reinforces the confidence levels of its applicability in sport literature.

One of the unique aspects of this dissertation is that it applies the IRT measurement model or, as it is known as Latent Trait Theory (LTT), rather than True Score Theory (TST). More specifically, dichotomous responses of multiple-choice assessments are analyzed with parametric techniques which provide a more accurate estimation of a student's sport literacy. The IRT model provides the ability of scaling that can be separate from the individual's own unique attributes. In simpler terms, the IRT model aids in the transitional transformation of raw data into scales that are not affected by anyone who partakes in a test or survey (Bond & Fox, 2007, Wright & Mok, 2000). The significance of this technique is that it will shift our notions of measurement and instrumentation in relation to sport management literature.

Appendix A: Interview Guide

Introduction
Thank you for agreeing to meet with us. I'm Ryan Kim from the Sport Management Program at The University of Texas at Austin.

We are speaking with College Basketball Experts/Fans/Associates to retrieve various beliefs and ideas in developing spectators' literacy and ability in watching college basketball. The study seeks to develop a conceptual framework that helps understand spectators' literacy with regard to college basketball games. As a college basketball expert/fan/associate, we would like to talk with you about your experience and/or expertise in college basketball. What we learn from today's discussion will also help us in designing materials and programs for college basketball spectators.

This interview will be audio recorded and we will treat your answers as confidential. We will not include your names or any other information that could identify you in any reports we write. We will destroy the notes and audio recordings after we complete our study and publish the results.

Do you have any questions about the study?

Grand tour Questions
To start off with, we are interested in your knowledge and experiences in college basketball.

- When was your **FIRST** experience with basketball and how did it affect you?
- Could you please tell us when you started watching college basketball and which **TEAM** you were interested in at that time and how long you have been following the team? Any team(s) you are currently interested in?
- Do you have any interesting stories that you want to share about your team(s)?
- Why are **YOU** interested in College Basketball? Why do you think the sport of college basketball is so interesting?
  (The first question is more personal while the second is more about the game.)
- What specific things make you **EXCITED** while watching basketball? What specific things make you **FOCUSED ON** while watching basketball? (examples)
- What are the interesting points that people should not be missing when watching basketball? (examples)

We have seen many people who have various degrees of knowledge and understanding on college basketball.

- Do you think it is important to **BE KNOWLEGEABLE** in order to watch college basketball? If so, could you please explain why? If not, please explain to us your reasoning.

Topic #1: Why Literacy matters?

You know a lot about College Basketball…

- How do you think your knowledge benefits you? Can you tell us about your thoughts based on your experiences?
  (Literacy in this case means being knowledgeable in watching basketball.)
  PROBE: Tell us about the kinds of benefits people will receive if they are literate in basketball.
  PROBE: What are the differences between people who are knowledgeable and who have less knowledge?
- How does literacy affect your sport experience?

Topic #2: Components of Literacy

Now, we'd like to discuss your beliefs and thoughts about the components of spectators' literacy.

- What words would you use to describe college basketball literacy?

- What kinds of knowledge help you watch basketball?
  PROBE: What are some examples of knowledge that you might think are important in fully understanding the game?
  PROBE: What are some examples of knowledge that helps you get interested
  What are some examples of knowledge that helps you increase your enjoyment of the game?
  PROBE: What are some examples of plays or scenes that interest you?

- What is your most memorable or enjoyable moment when watching college basketball? And why?

Topic #3: Development of Literacy

The last thing that I'd like to discuss with you is the development of spectators' literacy.

- How did you develop your knowledge and understanding on college basketball?
- Why do you think people are having difficulty in learning how to watch basketball? (examples)
- What are the knowledge components that you will tell a person who is watching a college basketball game for the first time?

[A Scenario Play] (20 minutes)
So, now that the hard part is out of the way, if you don't mind I would like to show you a short clip of a basketball game. While you are watching this clip I would like for you to imagine that it is my first time watching a basketball game. You may talk about the players, teams, rules, strategies, etc. Anything really. We will be watching along and taking notes. If you have any questions, please feel free to ask. So, are you ready to watch the clip?

[Watch Clip]

So, now that we have watched the clip.

- Was there anything interesting that you found about the game?
- What kinds of things did you find yourself talking about the most/least?
- Does this contradict or strengthen your previous statements about sport knowledge when watching basketball? And why so?

Well, that's all the questions that we wanted to ask.
Do you have any final thoughts about being literate in college basketball that you would like to share?
Thank you for your time and participation.

Appendix B: College Basketball Literacy Assessment Questionnaire

Q1. Have you ever watched a men's college basketball game?
Yes No

Q2. How long have you been watching college basketball? Please select a number (years) from the drop down menu below.
Less than 1 – More than 10

Q3. Have you ever watched a UT men's college basketball game?
Yes No

Q4. Have you ever played basketball?

Q5. How long have you been playing college basketball? Please select a number (years) from the drop down menu below.
Less than 1 – More than 10

Q6. Please rate your college basketball knowledge?
Extremely knowledgeable (5)
Very knowledgeable (4)
Moderately knowledgeable (3)
Slightly knowledgeable (2)
Not knowledgeable at all (1)

Knowledge Category: Rules

Item 1. If player "x" gets fouled shooting a basket inside the arc and misses the basket, what happens next?
1. Player x's team gets the ball at the baseline
2. Player x's team gets 1 free throw shot
3. Player x's team gets 2 free throw shots*
4. Player x's team gets the ball on the sideline
5. Player x's team loses the ball

Item 2. What would be a probable result of a coach yelling critically at a referee in a game?
1. A personal foul issued to the coach if the coach continues to yell
2. The referee ignores the coach all game
3. The coach is given a flagrant foul if the coach continues to yell
4. The coach gets suspended 10 games for detrimental conduct
5. The coach is issued a warning and then a technical foul if the coach continues to yell*

Item 3. What is a general meaning of the term “flagrant foul?”

1. Deliberate and excessive contact without a play on the ball*
2. Yelling at a player that you dunk on
3. When a player bets on the outcome of the game
4. When a coach hits his own player
5. When one player fouls another player when they’re shooting

Item 4. If a player attempts to shoot a legal 3-pointer, but his foot is on the 3-point line, how many points is he awarded if he makes it?

1. The basket doesn’t count
2. 1 point
3. 2 points*
4. 3 points
5. 4 points

Item 5. What do you have when a defensive player attempts to take a charge with his feet inside the semi-circle of the “paint” area?

1. A charge
2. A personal foul on the offensive player
3. A technical foul on the defensive player
4. A blocking foul on the defensive player*
5. A blocking foul on the offensive player

Item 6. When does a team begin to shoot “one-and-one” free throws in college basketball?

1. When the opposing team commits their 7th foul*
2. When the opposing team commits their 5th foul
3. After a flagrant foul on the opposing team
4. After a technical foul on the opposing team
5. After being fouled on a two-point shot

Knowledge Category: Skills and Drills

Item 7. Choose the best description for a “Floater”.

1. When a player shoots a 3-pointer and it floats in the air
2. When a player floats in the air to dunk the ball
3. When a player gets into the lane and shoots a high shot that elevates over the defender*
4. When a player shoots a free throw so high that it gives the impression of floating before making it in the net
5. When a player drifts around on the court he is known as a “floater”

Item 8. While on offense, how can offensive awareness help players who are off the ball?

1. Guarding a post-up
2. Rotate for blocks
3. Free throw shooting
4. Understanding what the opposing offense is running
5. Cutting to the basket when the defender's head is turned*

Item 9. Which part of defensive rebounding allows the creation of space against an opponent?

1. Crashing the offensive glass
2. Running to the ball without worrying about the opponent
3. Finding the opponent and boxing him out*
4. Jumping for the put-back rebound
5. Leaking out for the fast break

Item 10. Which parts of the setting a screen are necessary to complete a legal screen?

1. Setting your feet in one place
2. Establishing position
3. Making contact with the opponent
4. Moving your feet to compensate for lack of contact
5. a, b, and c*

Knowledge Category: Strategy

Item 11. Which player would most likely be a collegiate team's "Center"? (All players on same team)

1. Jim, who is 6 ft. and 150 lb. with a 5'11" wingspan
2. Andrew, who is 5 ft. 8 in. and 135 lb. with a 5'9" wingspan
3. Gerald, who is 6 ft. 11 in. and 250 lb. with a 7'2" wingspan*
4. A.J., who is 6 ft. 5 in. and 235 lb. with a 6'9" wingspan
5. Ali, who is 6 ft. 8 in. and 175 lb. with a 6'6" wingspan

Item 12. Why would an opposing team most likely trap the ball-handler on a pick and roll?

1. Because the ball-handler is a poor 3-point shooter
2. Because the ball-handler has been missing all game
3. Because the ball-handler has been attacking the basket well all game
4. In order to get the ball out of the ball-handler's hands and/or create pressure*
5. Because the team on defense has been running a triangle-and-two all game

Item 13. If team "X" shoots 3-pointers really poorly, what type of defense could a coach on the opposing team implement to protect the area nearer the basket while lessening the emphasis on 3-point coverage?

1. Zone defense*
2. Man-to-man defense
3. Full court press
4. Pressure defense
5. Trapping defense

Item 14. What type of offense could best spread out a man-to-man defense?

1. Post-up offense
2. Dribble hand-off
3. Box out offense
4. Triangle offense
5. 4-out-1-in "Flow"*

Item 15. How can a coach best use a larger size advantage offensively on post-ups?

1. Shoot 3's
2. Putting the players with a size advantage away from the basket to create space
3. Incorporating the players with mismatches nearer to the basket*
4. Zone defense
5. Double-teams on post-ups

Item 16. How can a team best use an opposing player's foul trouble against him?

1. Penetrate to the basket with your player who's being guarded by the player in foul trouble
2. Foul the player in foul trouble
3. Let the player in foul trouble guard someone without the ball
4. Play hard defense against the player in foul trouble
5. Make the player in foul trouble shoot free throws

Item 17. What should a coach do if his best player has 4 fouls with 3 minute to play in the first half and the team is playing defense?

1. Let him finish out the half with confidence
2. Substitute in your second best player who has 5 fouls for him
3. Take him out until later in the second half*
4. Run a play for him
5. Let him play through foul trouble

Item 18. In what situation would it be advantageous for a team to foul the opposing team on purpose?

1. When an opposing player is shooting a 3-pointer
2. When an opposing player is shooting at the buzzer
3. After you make a basket to tie the game with 10 seconds left and have no fouls to give
4. When your team is down 1 point with 20 seconds left and the other team has the ball*
5. When your team is up 2 points and the opposing team is in the act of shooting a half-court shot

Knowledge Category: History and Culture

Item 19. How does a university team generally get their basketball players?

1. By offering a professional player more money than they're making in the NBA
2. By recruiting high school players to their school with scholarships and the chance to play collegiate basketball*
3. By finding the best enrolled university students that can play basketball
4. By contracting players to play for a salary
5. By asking teenagers if they're interested and then taking them out of school to play

Item 20. What does it mean to be a "storied program"?

1. A program that has not been successful and thus there are a lot of stories about them
2. A controversial program where there's a lot of stories
3. A historically successful program in multiple years*
4. A team so good that people tell stories about them
5. A team that doesn't have a lot of historical success

Item 21. Generally speaking, what would it mean for a team to move from a "Power" conference to a historically "mid-major" conference?

1. Better chance at recruiting top high school players
2. More losses
3. The ability to make more money through sponsorships and TV revenue
4. Making less money with less TV revenue, less exposure, and a possible step down in competition*
5. Better competition and more money because "mid-major" conferences have more exposure

Item 22. Historically, what are the possible penalties if a team commits recruiting or academic violations when regarding players?

1. The players have to be expelled from school and give back the scholarship they received
2. There usually isn't any penalty, even if the NCAA knows the program broke the rules
3. Scholarship losses, vacating wins, and even expunging success from the record*
4. Players have to serve multi-year suspensions
5. The Athletic Director gets punished, but not coaches, teams, or players

Item 23. Who was the player that hit a game-winning turnaround jump shot against Kentucky in the 1992 NCAA Tournament?

1. Michael Jordan
2. Grant Hill
3. Chris Webber
4. Christian Laettner*
5. Bobby Hurley

Knowledge Category: Statistics

Item 24. What does PPG stand for?

1. Passes per game
2. Points per game*
3. Personal fouls per game
4. Points per goal
5. Points per goals

Item 25. How would a coach determine how well his/her team is shooting overall (excluding free throw shooting)?

1. Player field goal percentage
2. Team 3-point percentage
3. Player 3-point percentage
4. Team field goal percentage*
5. Player free throw shooting

Item 26. What would be the value of a coach looking at his team's "points in the paint allowed"?

1. It can tell the coach how his team is shooting 3-pointers
2. It can tell how many points in the paint his team has scored
3. It shows how many points his team has let score in the painted area*
4. It shows the amount of points scored in the paint as well the amount of points their team has scored in the paint
5. It doesn't give enough information to have any value

Item 27. What is the meaning of PER?

1. Personal energy rating
2. Player energy rating
3. Personal efficient reality
4. Player efficiency rating*
5. Personal energy real plus/minus

Item 28. If team X beats team Y by shooting 55% from the field and allowing 40% shooting, what deductions can reasonably be made about this game?

1. Team X won by playing great offense but still allowed team Y to shoot a very high percentage
2. Team X won by playing efficient offense as well as disrupting the opposition enough to force them to shoot a relatively low percentage from the field*
3. Team X won by disrupting the opposition enough to force them to shoot a low percentage even though team X shot very poorly from the field
4. Team X shot well from 3-point range but worse than team Y
5. Team Y is better defensively than team X

Item 29. What is another way of saying 'the amount of points and assists that a player accumulates for their team'?

1. Points produced*
2. Win shares
3. Assist-to-turnover ratio
4. PER
5. Net rating

Knowledge Category: Organizational Structure

Item 30. How many teams are in the men's NCAA Tournament?

1. 72
2. 64
3. 62
4. 68*
5. 74

Item 31. If a team loses in their conference tournament, with a record of 12-16, would they most likely make the NCAA tournament?

1. Yes
2. Yes, because they beat the #1 team in the nation
3. Yes, because if you win over 10 games you get an automatic bid
4. No*
5. Maybe, it depends on the preseason

Item 32. What does it mean for your team to get an at-large NCAA Tournament bid?

1. Your school is large enough to get in
2. Your team played well enough, according to the selection committee, to get in without winning the conference tournament*
3. Your team won its conference tournament
4. Your team's starting lineup is large
5. Your team had a great season but lost in the tournament so you have to apply for an at-large bid

Item 33. Why would a team in the Southland Conference need to win their conference tournament to get in the NCAA Tournament?

1. Because that team's conference is bigger than the Pac-12
2. Because usually that conference only sends 1 team to the NCAA Tournament and it is whichever team wins the automatic bid connected to winning the conference tournament*
3. Because the Southland sends 2 teams to the NCAA tournament
4. Because you have to win 30 games and your conference tournament to get in
5. Because the teams in the Southland don't have enough notoriety

Item 34. What does a team have to do in order to win the NCAA Tournament?

1. Win 6 or 7 games in the NCAA Tournament*
2. Have the best regular season record
3. Go undefeated for the whole season
4. Win your conference tournament
5. Be voted as champion by the committee

Item 35. What happens if a team hasn't had a good enough season to get in the NCAA Tournament but then wins their conference tournament?

1. They don't go to the NCAA Tournament because they didn't have a good enough season
2. They go to the NIT Tournament
3. They finish their season with the conference tournament championship
4. They get an automatic bid to the NCAA Tournament*
5. They go to the NIT and the NCAA Tournament

Knowledge Category: Terminology

Item 36. What is an alley-oop?

1. When a player throws bounce pass to a teammate before the teammate catches it, dribbles, and dunks it
2. When a player dribbles down the court, jumps, and dunks the ball
3. When a player dunks the ball off a rebound
4. When a player passes the ball to a teammate in the air and then the teammate dunks the ball while still in the air*
5. When a player passes the ball to another teammate who throws the ball away to the opposition who then dunks the ball

Item 37. What is the meaning of a "field goal"?

1. When a player makes a shot
2. A field goal is a made shot from either 3-point territory, 2-point territory, or the free throw line
3. A field goal is only a made basket in the field of play, excluding free throws*
4. When a player attempts a shot
5. When a player makes any type of shot, including free throws

Item 38. If team X plays a "zone" defense, how would they most likely defend team Y when they pass?

1. Team X would "show" and recover on all pick and rolls
2. Team X would shift their defense as the ball moves, while each player rotates his positioning*
3. Team X would have each player guard an opposing team's player, never leaving their man
4. Team X would double-team and trap the opposing ball-handler as they bring the ball up
5. Team X would double-team the other team's best player

Item 39. What is the value of a "flop"?

1. It could confuse the referee into making a call in your team's favor*
2. The referee changes the call in order to benefit the other team
3. The coach complains in order for the referee to "flip-flop" the call
4. Distracting a good player so he plays badly, or "flops"
5. "Flopping" to move out

Item 40. What's an affectionate term for the end of the season conference and NCAA tournaments?

1. Final Four
2. Sweet 16
3. Crunch time
4. March Madness*
5. Bracket season

Team Identification

For each Statement below, please response that best expresses your opinion of UT college basketball Team (1 (strongly disagree) ~ 5 (strongly agree))

When someone criticizes UT basketball team, if feels like a personal insult.
I am very interested in what others think about UT basketball team.
When they talk about UT basketball team, I usually say "we" rather than "they".
UT basketball team's successes are my successes.
When someone praises the UT basketball team, if feels like a personal complement.
If a story in the media criticized the UT basketball team, I would feel embarrassed.

Demographics

Q7. Which category below best describes your ethnicity?

African American/non-Hispanic black
American Indian or Alaska Native
Asian American/Pacific Islander
Caucasian/non-Hispanic white
Mexican American/Hispanic
Other

Q8. I identify my gender as:

Male
Female
Transgender
Other

Q9. What is your current education classification (check one)?

Freshman
Sophomore
Junior
Senior
Graduate Student

Q10. What is the likelihood that you'll watch or attend UT basketball game next season?

Extremely likely
Moderately likely
Slightly likely
Neither likely nor unlikely
Slightly unlikely
Moderately unlikely
Extremely unlikely

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